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THE

AMERICAN JOURNAL

OF THE MEDICAL SCIENCES

FOR JULY 1880.

ARTICLE I.

RESEARCHES ON THE STATE OF THE GANGLIONIC CENTRES IN BRIGHT'S DISEASE.

By J. M. DA COSTA, M.D., and MORRIS LONGSTRETH, M.D., Physicians to the Pennsylvania Hospital, etc.

THESE researches were begun in the spirit of pure investigation, since, so far as we were aware, no observations had been made of the condition of the ganglia or nerves supplying the kidneys in Bright's disease—a disease in which, as all are agreed, great alterations in the vessels and in the vascular supply, not only of the urinary secreting organs, but of the whole body, exist, or are brought about as the results of secondary changes. It seemed to us, therefore, that some morbid condition ought to be met with in the nervous arrangements that have for their chief office the regulation of the blood supply. Moreover, reflecting on the fact that the kidney affection is always both sided, and on the nervous phenomena which so often attend Bright's disease, we thought that exploration of the nervous system, especially of the ganglionic nervous system, might throw some light alike on the origin of the complaint and the accompanying signs of nervous disturbance. But while we were of the opinion that some altered states would be found to exist in the nervous centres, of the nature of such alterations we had no theory and no conclusions to substantiate; and now for the first time, more than a year subsequent to the investigation of the last case given in this series, and more than four years since our first observations, we attempt to formulate the results of the work. In the mean time, many cases of Bright's disease, in one or other of its many forms, have been partially investigated, but are not included in the present series, because we feared that they would vitiate the results, as some were cases of amyloid degeneration, others were complicated with coexisting chronic disease of different character, and as in others, again, the specimens were not treated in precisely the same manner as was done with all the specimens in the present series.

In the first investigations, the nerve-trunks supplying the kidney were examined, but the results furnished nothing satisfactory. In all the present published cases, the method of treating the specimens—we refer particularly to the ganglia—was invariably the same; so that whatever criticism is made of the conclusions arrived at, none of the ante-mortem conditions, so far as preserved at the time of the autopsy, have been varied by irregularities of preparation. The difficulties of obtaining the ganglia were great, and the specimens required a long dissection, which was performed while they were kept submerged in the preservative fluid. The separation and isolation of the ganglia were rendered difficult by large amounts of fat surrounding them, inclosed in a firm connective tissue; the exceptions to this condition were found in Cases 7, 8, and 9, and partially in Case 6. The ganglia were obtained by removing, along with the kidneys and suprarenal capsules, all the structures in front of the vertebral column, including the aorta and cœliac axis, the attachments of the diaphragm, and the splanchnic nerves. From this mass the connective and adipose tissues were carefully separated, leaving the solar plexus and its nerve-branches. The portion of the ganglia examined microscopically was that from which the nervous filaments were given off for distribution to the kidney; other portions of the ganglia were also examined for comparison.

Let us now take a set of cases in which striking pathological changes were discovered.

Case I.—This was a case of a single lady, aged 43, seen by one of us in connection with an eminent physician of Philadelphia. She had been at times under his care for a year with dyspeptic symptoms, but otherwise appeared in fair health; there was not a particle of dropsy. Spending the summer at the sea-shore, she had not been under observation immediately before the fatal illness, and sent for her physician in consequence of nausea and vomiting and some shortness of breath. A marked pericardial friction sound was detected, and an examination of the urine showed it to contain about one-third of the test-tube full of albumen and granular tube-casts. The malady became now as markedly vehement as previously it had been latent; twitching of the muscles, followed by general convulsions, set in. These were succeeded by uræmic coma, and death took place in about a week after the development of the pericarditis.

Post-mortem Examination, by Dr. Longstreth. November, 1877.—*Cavities*.—There was considerable serum in the peritoneal cavity, but no lymph. The *pleural* cavities contained more than the usual serum, which was bloodstained; but no lymph. The surface of the pleura was injected. There were some old adhesions on both sides. The *pericardium* showed an intense pericarditis. The walls were thickened, the sac distended with clouded serum and a large amount of lymph. The lymph lay in folds, was recent, and could be torn off from the surface of the heart or of the sac, leaving the membrane rough and displaying injected vessels.

Heart.—The ventricles were uncontracted, and contained a small amount of blood and recent clots, less on the left side than on the right. The organ was of small size; its left ventricle hypertrophied. The cavities, orifices, and valves normal; the muscular structure firm and of dark colour, especially near the surface. The other organs of the body presented nothing of note, except the urinary apparatus.

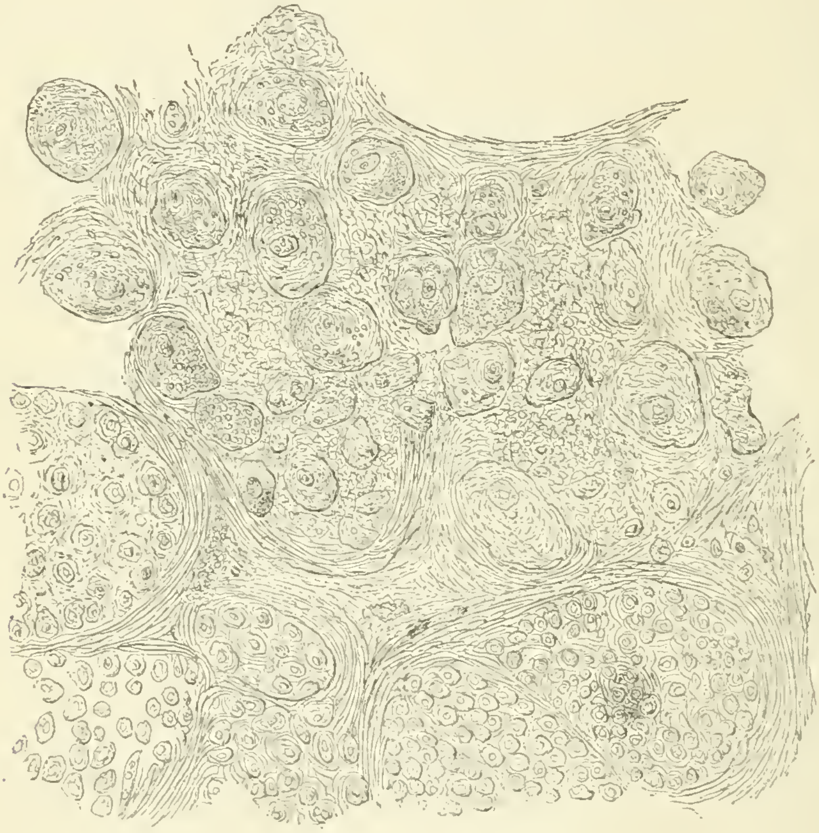
The *kidneys* were much reduced in size, pretty regular in outline, but with a nodulated surface. The veins showed prominently on the surface of the capsule. The cortex was greatly wasted, in most parts barely forming a covering at the bases of the pyramids. The interpyramidal portions were reduced to a lesser degree, but had also suffered contraction. The straight tubes of the pyramids were twisted near the base. The colour of the pyramids was redder than the cortex, which presented an opaque striated appearance. The capsule was much thickened, and tightly adherent. After removal the surface of the kidney was found highly granular and nodular. The capsule did not tear the kidney on removal because of the great firmness of the organ, which was dense like cicatricial tissue. The kidney had a highly urinous odour, and was imbedded in a thick layer of fat, although the adipose tissue at other parts of the body was reduced in amount.

Microscopic Examination of the Renal Ganglia.—The capsule of the ganglia was composed of a broad band of thick-fibred closely-matted connective tissue; no cellular elements were present. Its vascular supply consisted of numerous large thick-walled vessels, especially the muscular tunic; scarcely any capillaries were visible in it. The adipose tissue was in large amount. The connective tissue was very marked along the nerve trunks, and penetrated the ganglion mass along with them. At the peripheral portion it encroached upon the nervous tissue, and sent into it bands of coarse fibres which will be described later.

The ganglion cells were in the highest degree altered. In unstained specimens they mostly appeared as yellow spots without distinct structure; rarely could any nucleus or nucleolus be detected, and very often they appeared as areas filled with large oil-globules. In stained specimens, in some parts of the ganglia, a shrivelled small nucleus could be frequently discerned, and more frequently the nucleolus; at other parts the condition of the cells was no better than that already referred to in the unstained specimen—the cell body filled with granules and fat, often considerable pigment, the nucleus and nucleolus nearly or quite invisible. Many of the cells were reduced in size, especially those showing markedly degenerated conditions; their outlines were irregular and sometimes puckered or folded. In many parts of the ganglia the whole substance over small areas was converted into a granular and fatty mass, the ganglion cells as well as the surrounding connective tissue having degenerated.

The connective substance of the ganglia everywhere presented a coarse, closely-matted, firm, fibrous appearance. It was generally devoid of cells, or, where these elements were present, they were highly granular and fatty. The cells were rounded in form; no elongated or spindle-shaped bodies were visible. This connective tissue encroached closely upon the ganglion cells, and often formed concentric coarse-fibred rings around them. The connective tissue entered the ganglionic mass along with the nerve trunks, and penetrated it from the envelope. It passed through the interior as broad bands of fibrillated tissue, which partitioned off the ganglion cells into very distinctly-formed compartments, often containing but a single cell, or twos and threes. The cells around which the connective substance was the firmest generally showed greater degenerative changes than their fellows, but this appearance did not universally hold. The connective tissue development was often most marked in the central portions of the ganglia; it was by no means the condition universally found at the peripheral portions in connection with the thickening of the capsules.

Fig. 1.



At the left of the figure are seen the nerve-tubules in cross section, surrounded with increased connective tissue continuous with that covering the ganglia. The ganglionic cells show numerous oil-globules and granules. The basis substance between the cells is fibrous in character, and granular and fatty changes are present. × 350.

The vessels of the ganglia were not numerous; they were of large size, with thickened walls, and surrounded by large amounts of firm connective tissue, in which lymphatic vessels were visible. This case, indeed, was the only one in which the lymphatic vessels were discovered within the ganglionic mass, although vessels of this character were seen not unfrequently in the connective capsules in the other cases. The vessels were generally found empty, and some had collapsed from the contraction of the connective-tissue growth around them. In a few instances evidences of old hemorrhages in the interior of the ganglia, near some of its vascular trunks, were encountered, but none of them were of recent date.

The microscopic changes in the ganglia in this case were then of striking character, and involved all the component parts. The connective tissue covering the nervous mass was very much thickened; the connective substance in the interior presented a firm fibrous appearance. The ganglion cells showed advanced degenerative changes, and were in many parts barely recognizable. The vascular supply exhibited marked alterations from the normal condition; thickening of the vessel walls, hypertrophy of the muscular coat, and increase of the surrounding connective tissue, with collapse and closure of their lumina.

The post-mortem examination proved that the kidney disease was of long standing, and that the contraction of the organ had advanced very far. A careful microscopic study showed the changes to be similar to those usually found in kidneys presenting the gross appearances already described.

Case II.—Mary A. D., æt. 60, widow, was admitted to the Pennsylvania Hospital, December 24, 1878. She was picked up in the street in an unconscious condition and brought to the hospital at 9.15 P.M. No history could be obtained as to her previous health. She could be only very slightly aroused, but did not speak. The pulse was 90 per minute, strong and full; respiration 28, and rather laboured. The right pupil was contracted to about one-third below the average size, and the left one as markedly dilated; both were insensible to light. Over the whole chest loud mucous râles were heard, so loud that the character of the heart-sounds could not be determined. There was no obvious paralysis. Her breathing gradually became stertorous, and slight convulsive movements of the muscles were noticed every few minutes, lasting a few seconds. There was no œdema of any part of the body. Her urine, drawn with catheter, was found to contain a large amount of albumen (about one-third), and the microscope showed the presence of granular casts. The patient died eight hours after admission.

The *post-mortem examination* was made by the Coroner's physician, and no accurate notes were obtained. A large apoplectic clot was found in the left half of the brain. The kidneys were very considerably contracted, and many small cysts were present on their surface. The capsule was thickened and adherent, and the cortex was very greatly reduced in thickness. The organs were imbedded in a large amount of fat, and had a strongly urinous odour.

The surface of the *kidney*, as seen in the microscopic section, was highly granular; the capsule was thickened, and was composed of coarse-fibred connective tissue, closely matted together. Numerous large and small sized vessels were distributed through it, and in places they connected with the vascular supply of the cortex. The lymph spaces in the capsule were not numerous or large. The union to the cortical tissue was very intimate, and in many places the capsule dipped down and was continuous with broad connective-tissue bands in the periphery of the organ. The point of junction between the two was marked by the aggregation of round cells, which stained very deeply with carmine. Several cysts were seen on the surface, mostly occupying the cortical tissue, but also projecting and causing a prominence of the capsule.

The thickness of the cortex was greatly reduced; under a magnifying power of 50 diam. its width occupied a little more than the breadth of one field of the microscope. The arrangement of the component parts in the cortex was found much altered; the Malpighian bodies were very irregularly placed, and the tubes of the cortical pyramids pursued a twisting direction. The Malpighian bodies were of pretty regular outline, but were surrounded by a broad capsule of connective tissue, which presented a swollen appearance, and contained many new cellular elements, mostly spindle shaped. The Malpighian bodies frequently appeared as homogenous, concentrically arranged connective-tissue masses, without cellular elements and without traces of the capillary tufts. In other parts the capillary tufts were indistinct from the presence of cellular collections themselves granular and indistinct, but in some they were injected and the blood corpuscles were readily distinguishable. The convoluted tubes were irregular in outline, their basement membranes moderately swollen; their epithelial cells were very granular and a little fatty; their nuclei generally obscured and staining poorly with carmine. In other tubes the nuclei were sharply defined and well coloured, but the bodies of the cells were still very granular, but less so than in the other instances. Many tubules were filled with casts or granular matter.

The connective tissue between the tubules was everywhere swollen and increased; in many parts of the cortex it was packed full of cellular elements, both round and spindle-shaped; so great were these collections of cells that in places the outlines of the tubules were concealed; in other perts the tubular structure was lost in firm, coarse-fibred connective tissue. The various parts of the cortex exhibited great differences in the degree of alteration which had taken place in it.

The branches of the renal artery at the bases of the pyramids showed as widely stretched-open, thickened walled vessels, surrounded by an increased amount of connective tissue. The muscular coat was greatly hypertrophied. The connective tissue around the vessel was prolonged into the cortex, and in places was filled with cells which obscured the tubules, but in other places there was a coarse-fibred overgrowth which had destroyed the cortical structure and into which small hemorrhages had taken place.

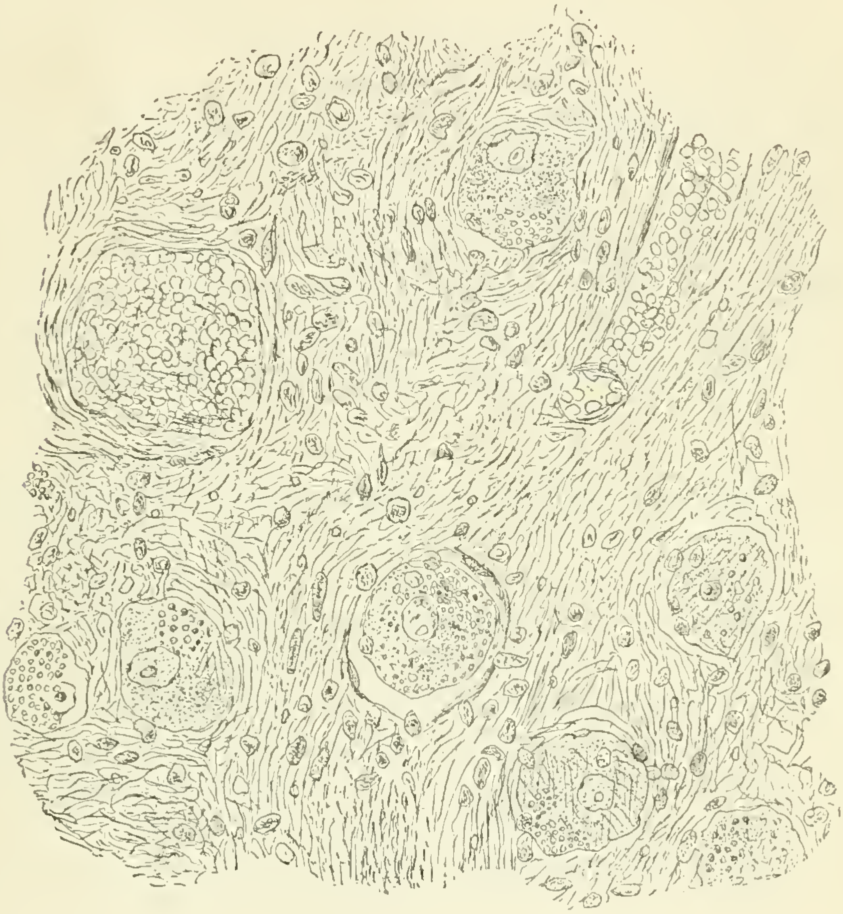
The vessels of the cortex showed greatly thickened walls, but their course was so altered from the straight direction that they could not be traced. The straight tubes of the medullary cones showed no changes, but the vasæ rectæ were dilated and injected, and the connective tissue around them was increased.

The *ganglionic masses* were enveloped by a thick layer of connective tissue, richly supplied with bloodvessels and encroaching on the nervous tissue and also accompanying the nerve trunks at their exit from the ganglia. There was a considerable mass of adipose tissue around this tissue. The nerve trunks showed an increased amount of connective tissue in their interior as well as surrounding them, but neither here nor in the connective tissue enveloping the ganglia was there any abnormal abundance of cellular elements.

The ganglionic cells were much altered. They appeared shrunken, and their outline was indistinct. The nuclei and nucleoli were difficult to make out. The cell bodies were more or less filled with fatty granules, in some cases occupying nearly its whole space, in others collected in heaps, or else isolated and scattered through the interior. They were also generally markedly pigmented.

The tissue of the ganglia was composed of finely striated connective tissue, in most places clear and nearly transparent, or else having a granular aspect; in other parts, generally towards the periphery, there were present in it pale, usually indistinct, and poorly stained round cells or nuclei. In the peripheral portions the ganglionic cells, when not overlaid and obscured by the new cellular elements, generally showed their structure more distinctly than in the parts more central.

Fig. 2.



The ganglionic cells show fatty degeneration, and their outlines are indistinct; their nuclei and nucleoli obscured. The basis substance is fibrous and contains some cellular elements. The vessels are large and filled with blood-corpuscles. × 350.

Many large capillary vessels were seen, especially near the superficial portions of the ganglia, entering it either from the connective tissue or along the nervous trunks; in the interior the vessels were of smaller lumen and surrounded by especially thick connective tissue.

The general aspect of the sections in this case gave the impression of degeneration of the ganglionic cells of marked degree, and of a connective-tissue overgrowth within the ganglia which had progressed beyond the stage of granulation tissue to completely formed fibres in which the cellular elements were no longer visible.

We shall not dwell on the interesting clinical questions here connected with the profound coma, the state of the pupils, and the double lesion which determined the symptoms, but, in accordance with our purpose, pass on to an examination of the renal affection.

The appearances of the kidneys and their microscopic examination show conclusively that the renal disease was of long duration, and was of that form which is so frequently unattended with the obvious symptoms of Bright's disease. The contraction of the organ is found not to be equally complete at all parts. In many the process of interstitial inflammation is still in progress, evidenced by the presence of the numerous connective-tissue elements, whilst in many other parts this process has advanced to cicatrization, and in the latter areas the vessels, tubes, and cells have perished.

The microscopic appearances of the ganglia show thickening of the capsular envelope and markedly degenerated appearances of the ganglion cells. The changes in the connective substance of the ganglia demonstrate a connective-tissue hyperplasia by the increased cellular elements and increased firmness of the fibres; but both these constituents are also undergoing degenerative changes, for both are granular. The increased vascularity of the specimens is a striking feature; their vascularity is, however, diminishing.

It is evident in reviewing the description we have given of the condition of the renal ganglia, as seen with the microscope, that very grave changes have taken place in the structural elements, and that these changes were somewhat proportional to the alterations of the kidney and also to the clinical phenomena. In fact, while arranging and classifying our cases for use in this paper, the question arose whether the classification should be made on the basis of the kidney alterations or on those found in the ganglia. But this question in great degree solved itself, for it was soon found that, viewed in either way, the examples fell into the same classes. We do not wish to imply that the cases, in the changes they exhibit either of the kidneys or in the ganglia. form an evenly graded series. The groups or classes which we have made imply only that some cases show greater changes than others, and not that the changes of one class are of different character from those found in the other; the classification, in other words, is made on the basis of quantity rather than of quality.

In group I. are then the cases with the most striking alterations. The first is a well-marked one of chronic Bright's disease with contracted kidney, characterized by a long period of latency of the symptoms, followed by an outburst of inflammation of the serous membranes, which acted as the proximate cause of death. In the second case, the ante-mortem conclusion that the kidneys were much diseased was confirmed by the autopsy, and the death here resulted, as so frequently occurs in cases of contracting kidney, from cerebral hemorrhage. The kidneys in each of these instances belong to the variety characterized by the results of interstitial inflammation, and the changes in the muscular coats of the arteries were such as are usually found in this variety.

Without further particularizing the kidney changes, let us see what are the alterations in the ganglia, and what conclusions are to be drawn from the microscopic appearances presented. In the first place we wish to emphasize the condition of the tissues surrounding not only the kidney but the ganglia, viz., the accumulation of fat around the former, and the firmness and tight adherence of the connective tissue, inclosing in its meshes adipose cells, around the latter. The increase of fat around the kidney in chronic Bright's disease is a condition with which we have long been familiar. The accumulation of fat is invariably very great, irrespective of the condition of the other portions of the body in this respect. In a cadaver in which fat is to a great degree absent from the places in which this tissue usually accumulates, it is nevertheless found in large amount around the contracted kidney. One or even two inches of fat is no unusual amount to be found around these organs even in emaciated subjects dying of chronic contracted kidney. The fat, too, is firmly adherent to the organ, and penetrates the chinks around its pelvis, and on the principal section of the kidney is seen to be intercalated with the calyces. The deposit of fat is a very striking condition, and to which hitherto no allusion has been made.

The ganglion cells present changes such as are usually described as fatty degeneration and atrophy. There is breaking down of their substance into granules and fatty globules, which more or less obscure the nucleus, and even when the nuclei are visible they show more or less the same changes.

The connective basis-substance of the ganglia has apparently passed through the active stage of hyperplasia, and is undergoing the contractile process which we are so familiar with in the kidney, and which we have also found to have taken place in the tissues outside the ganglionic masses. This substance has passed the active stage of formation, and its elements also are undergoing degenerative changes.

We shall next look at a series of cases forming a *second group* in which the disease was somewhat different, and the renal changes less marked, though still very obvious.

Case III.—Catherine R., æt. 35, was admitted to the Pennsylvania Hospital, March 24, 1879, suffering from a lacerated wound of the left forearm, caused by falling through a window nine days previously, while drunk. The wound was dressed, and she was attended to daily at the outpatient department until the 24th inst., when she was sent into the wards suffering from severe diarrhœa and incontinence of urine. The patient had been a hard drinker for a long time, and had led an exposed life. The wound was very slow in healing. The urine was albuminous, but, owing to the difficulty in collecting more than a very small amount, no casts were discovered by the microscopic examination. She died suddenly six days after admission, March 30th.

Post-mortem examination, by Dr. Longstreth.—*Cavities.*—The *peritoneum* showed nothing of note. There were many old *pleural* adhesions. The *pericardium* was normal.

Heart.—The ventricles were relaxed. The aortic valves showed old endocardial disease, but were not incompetent. The left ventricle was slightly hypertrophied, its tissue was pale and less resistant than normal. The cavities were of normal size. Weight, 10 ozs. The *aorta* was dilated, and presented atheromatous changes at its transverse portion. *Lungs.* Both apices showed old cicatricial depressions, and small quiescent cheesy nodules. The *spleen* exhibited a patch of chronic capsulitis, and its fibrous tissue was increased. Weight, 8 ozs. The *liver* was irregular in outline, firm, and reduced about one-half in size. The fibrous tissue was much increased, and its capsules thickened and adherent, leaving on removal a granular surface.

The *kidneys* were reduced in size, presenting a slightly swollen appearance; firm, and irregular in outline. On section, the cortex was found much diminished in thickness, the capsule was tightly adherent and thickened, and on removal left the surface of the organ markedly granular. The urinous odour was very decided. There was no disease of the ureters or bladder. In a microscopic section of the organ, cut vertically, the capsule was seen to be much thickened; it was composed of coarse connective tissue fibres, rather widely separated, and presenting a swollen aspect. The capsular connective tissue was thoroughly permeated by blood and lymph spaces, which gave it a net-like appearance, and its tissue was in places crowded with cellular elements. On the surface of the cortex, in one of the sections, could be seen a small cyst, which had raised the capsule. Both in the capsule and in the cortex at its outer portions the accumulation of cellular elements was especially marked.

The walls of the larger branches of the renal artery, at the junction of the cortex and medullary portions, showed an increase in the thickness of their coats of marked degree; the change was especially noted in the muscular coat; the connective tissue around the vessels was greatly thickened, and in many places was crowded with new cellular elements. The vessels of the cortex (arteriolæ ascendentes) showed dilatation, thickening of their walls, and were tortuous in their course. The thickening consisted in hypertrophy of the muscular cells, the nuclei of the muscular fibres being very distinct. This condition was present in all the arterial vessels, both the larger and the smaller ones.

The condition and appearance of the Malpighian bodies differed greatly in the various parts of the section. Some of the bodies showed but slight increase of their connective-tissue capsules, or whilst in some this connective tissue was swollen and hyaline-looking, its individual fibres were not dense and broadened. In the majority of the bodies the capsules were thickened to three or four times their normal width; in all of them the cellular elements were very abundant, in some crowding the spaces between the capillary loops and even obscuring the vessels. The capillary tufts varied greatly in their condition in different parts of the kidney; in some bodies the circulation was evidently very free, the capillaries having their ordinary calibre; in others, the accumulation of cellular elements was so abundant, and the increase of connective tissue so marked, that the lumina of the vessels were encroached upon. This, at least, was the post-mortem picture presented, whatever may have been the actual state of the circulation during life.

The connective tissue between the convoluted tubules was also increased, varying, however, in different parts of the kidney, from a simple swelling of this tissue, with a greater or less abundance of infiltrated cells, to a heavy-fibred tissue, which was generally devoid of the cellular elements, except in parts near the larger vessels, or near markedly compressed Malpighian bodies. The increase of connective tissue had, of course, led to compression of the tubes; this change was more noticeable at the peripheral portions of the cortex.

The condition of the epithelial cells of the convoluted tubes was in places nearly normal, and in these parts little change was found also in the intertubular spaces; in other parts, the cells were very highly granular, their nuclei obscured, and, in some, fatty changes were evident. A large number of the tubes were filled with tube casts, containing abundance of granular matter and detached and degenerating epithelium.

The straight tubes of the cortical pyramids and the tubes of the medullary cones, as well as their surroundings, showed little change. In the latter set of tubes, a number of tube-casts were visible *in transitu*.

The vascular connection between the cortex and the capsule of the organ was greatly increased, and in many sections large vessels were seen passing both from one to the other, filled with recent coagula, in which the red corpuscles could be discovered. Around these new vascular trunks the cellular infiltration of the tissue was always more abundant, and the intertubular connective-tissue changes most advanced.

Microscopic Examination of the Renal Ganglia.—The periphery of the nervous mass was seen to be surrounded by a broad layer of connective tissue, the individual fibres of which were stout and generally closely matted; in many parts the connective tissue was looser and the meshes filled with adipose cells. The nerve trunks entering the ganglia were also surrounded by a firm connective tissue, more abundant than in the normal condition, which was in parts filled with small cells or nuclei, which very readily took the carmine staining. The fibres of the nerve trunks and also the nerve bands or tracts within the ganglia were normal.

The nerve cells (ganglionic cells) at all parts, though varying in degree in different situations, presented strikingly abnormal conditions. The nucleoli were not visible in the great majority of the cells; in fact, in only a few instances could the nucleoli be seen as clear shining bodies within the nuclei; in others the existence of them could be made out only by the lighter shade of colour at some part of the nuclear body. In no instance did they present a normal appearance. The nuclei stained with carmine but poorly, their outline was often irregular, in some instances angular, and their structure could not be distinctly studied owing to changes in the cell body, but no alteration was found in them.

The bodies of the ganglion cells, in the great majority of cases, were irregularly shaped and angular in outline; some, however, were round and plump looking, and these cells showed their nuclei and nucleoli quite distinctly and in their general appearance were more normal looking. In the majority the cell body was highly granular, and exhibited numerous minute oil globules. The oil globules were irregularly aggregated, in some, occupying a small area at one end of the cell, in others, placed more centrally, close up to the nucleus, and in others, nearly the whole cell body was occupied by them. The degree of fatty change seemed to bear some relation to the shape of the cell, the greater the degenerative changes the more irregular the shape. The processes of the ganglion cells could in many cases be traced a short distance from the cell body.

The substance of the ganglia, the tissue around the ganglionic cells, showed in this case very marked alterations and deviations from the normal. It was made up of an almost transparent granular basis, in which at places a fine striation could be detected. In the basis substance were cells of varying shape and size, some apparently simple nuclei, others having a very small body containing a relatively large nucleus—the nuclei in both cases were about the same size; others were of irregular shapes, some elongated at one pole, others bipolar, and others presented an elongated spindle-shaped figure, having a centrally placed nucleus and long waving processes. These cells stained deeply with carmine, the nucleus of course taking a deeper coloration, but the whole body of the cell was also more or less coloured, except in some of the more elongated spindle cells, whose processes remained uncoloured. The arrangement of these cells presented no definite regularity. In some places they were heaped up around the ganglion cells, and were frequently seen overlying the cell bodies; in other parts they were less abundant, and often formed a ring or cleared space around the nerve-cells. The spindle-cell processes did not take any general direction, and were often seen lying across each other. The ganglion cells around which were cleared spaces, were usually more normal in appearance than those around which the cells were closely heaped, but exceptions to this rule were noticed.

The vascular supply of the ganglionic tissue was greatly increased; numerous capillaries were found, and numbers of large dilated thin-walled vessels in which the red corpuscles were crowded. The cellular elements were abundant in those parts where the increased vascular supply was found, and spindle cells were also more abundant here, and were often found arranged either parallel or concentrically to the lumen of the vessel.

The exciting cause of death in this case was the injury received about a fortnight previously. The history of the patient further shows that her mode of life was such as to produce kidney disease. For the completeness of the case it is to be regretted that the microscopic examination of the urine was not more successfully carried out, but with the aid of the post-mortem record nothing is needed to classify this case along with the others, as one showing advanced renal disease.

The microscopic examination of the kidney showed that the organ was to a marked degree contracted, and that the change was of considerable duration. The interstitial process, however, had not subsided or was perhaps rekindled to greater activity as the result of the injury from which the patient had suffered. The epithelium of the tubules was in the condition usually found in kidneys of this character; in parts where the contraction was marked the cells were greatly degenerated or had wholly disappeared, whilst in others where the connective tissue changes were less advanced the epithelia were often found well preserved.

The renal ganglia, in this case, presented marked evidences of degenerative changes of its ganglionic cells. The connective substance of the nervous masses showed decided formative activity of its cellular elements; the vascularity was greatly increased.

CASE IV.—Adolph L., æt. 50; married, gasfitter; was admitted to the hospital September 19, 1878, in an unconscious condition. But shortly consciousness partially returned, and when asked his name he said L., yet this was the only response in words that could be gotten from him. No history could be obtained of his previous condition. Both pupils were tightly contracted. Respiration 24; pulse 90, full. Twitchings of the muscles of the left side of face were noticed; the right side of the face was paralyzed. His mouth was drawn somewhat to the left, and on protruding the tongue its tip deviated to the right. The right arm and leg were paralyzed. The urine was cloudy, acid, sp. gr. 1009. It contained about one-sixth its bulk of albumen.

20th. General condition about the same; intelligence improved; he muttered when spoken to, but no words could be distinguished. He was rather restless in bed, and had passed his urine and feces unconsciously. Swallowed fluids with some difficulty. His chest was full of coarse mucous râles. No cardiac murmurs were heard. The superficial arteries were noticed to be very tortuous.

21st. His condition about the same. A microscopic examination of his urine showed that it contained great numbers of highly granular and fatty casts, as well as hyaline and oil casts, free fat globules, and fatty and granular renal epithelium. Respirations 48; pulse 160.

22d. Respirations 42; pulse 168. Total paralysis of sensation and motion over the right half of body. Death at 11 P. M.

Post-mortem examination, by Dr. Longstreth.—*Head.*—Calvaria normal. The dura mater was found tightly adherent to the bone and in places to the convexity of the brain. At the base, the vessels were markedly atheromatous. The left lateral ventricle was filled with black clots of blood, which came from an extensive laceration of the optic thalamus. The *cavities* of the body presented nothing especial.

Heart.—Weight 12 oz. avoird. Its left side was firmly contracted; its right side was distended with clots. The aortic valve was competent, but both the aortic and mitral valves were atheromatous; their surfaces were smooth. The left ventricular cavity appeared of smaller size than normal, and its wall was thickened, especially towards the base. The *lungs* showed deep posterior congestion.

Kidneys were much reduced in size; the left one weighed 2½ ounces; the right 2 ounces. They were of a pale yellowish colour, rather flabby in consistence; their capsules thickened, not tightly adherent, and after removal left the surface of the organ finely granular. The cortex was much reduced in thickness, although its thickness in proportion to the length of the medullary cones, was less altered than is usual in kidneys so much reduced in size. They had a strongly urinous odour.

Microscopic Examination of the Kidney.—The surface was uneven and irregular in outline, but not markedly granular, although at places granulations were visible. The capsule was moderately thickened, loose in structure and not strongly adherent to the surface of the organ. Several large vessels were seen in it, and the remains of numerous small ones; and the lymph spaces were large and filled with a granular debris. Beneath the capsule were a number of cysts not larger than Malpighian bodies. The connective tissue of the capsule was encroaching on the cortex, and several of the Malpighian bodies were involved in its deeper layers. The walls of the bloodvessels were only moderately thickened, the increase being due to swelling of their tissues. The connective tissue surrounding them was of loose character, and the middle layer showed its muscular fibres very indistinctly, and this portion exhibited marked granular degeneration.

The capsules of the Malpighian bodies appeared as broad bands of swollen connective tissue, nearly devoid of cellular elements. These capsules did not show as well defined, firm connective tissue directly encircling the capillary tufts as in many of the other specimens, but as a loose tissue extending diffusely into the surrounding area, and involving and destroying the neighbouring tubules. Very many of the Malpighian bodies appeared as homogeneous structureless masses, very granular in character and pigmented; in others, the capillaries showed distinctly, but not injected, and were surrounded by a slightly increased connective tissue.

The convoluted tubes were irregularly swollen in some places and contracted in others; many tubes were stripped of their cellular lining, empty and collapsed. Their basement membranes were swollen and thickened, and in many places fused with the surrounding overgrowth of connective tissue. The epithelial cells were highly granular and fatty; their nuclei were, as a rule, not visible, and the whole group of cells lining the tubules were swollen. The lumina of the tubules were choked with casts of great variety of structure; though mostly granular and fatty. The straight tubes of the medullary cones were much altered; their epithelial linings were indistinct, and very many of them were filled with casts.

The connective tissue of the cortical portions was greatly increased; the spaces between the tubules were widened, the tissue fibrillated and granular, and mostly devoid of cellular elements. In many places the encroachment of the intertubular connective tissue and the collapse of the tubules had converted the cortical substance into a mass of striated fibrillar tissue, in which holes of small size filled with granular detritus, were seen.

A general survey of the cortex showed that in about one half of it the tubules, with their degenerated epithelium in position, were intact, and that in the other half the connective tissue overgrowth, itself in a highly granular condition, had encroached upon and destroyed the tubules and Malpighian bodies, so that only their remains could be detected.

Microscopic Examination of the Renal Ganglia.—The ganglia were surrounded by thick, firm, connective masses, very abundantly vascular, and containing a moderate amount of adipose tissue. The connective tissue was especially abundant around the nerve trunks at their points of exit, and was unusually noticeable in the interior of the nerves.

The ganglion cells presented a confused, indistinct, and smeared appearance; they were very distinctly isolated from their surroundings, but their outline was irregular, and the cell bodies looked as though shrivelled. This condition was more marked in the more central portions of the ganglion, while towards the periphery many cells were more plump and rounded. The substance of the cell bodies appeared degenerated, although the granular and fatty changes in them were not as distinctly visible as in many of the other cases; in the stained specimens the tissue appeared like a blot of colour without definite structure. The nuclei were mostly very indistinct, and appeared blended with the cell body. The nucleolus, however, was very frequently discernible as a dark dot.

The tissue of the ganglia was strikingly altered. It was mostly composed of a coarse, firm, connective-tissue substance, in which were seen a moderate number of small round cells or nuclei and spindle cells. These cells, especially the round ones, were highly granular and not perfectly rounded, and the spindle-shaped ones were being converted into fibres. They stained very imperfectly. In the central portions of the ganglia this connective tissue was firmer and coarser, and was arranged so as to form cleared spaces concentric to the ganglion cells.

The vascular supply within the ganglia was scanty, and was carried on by relatively large capillaries, surrounded by considerable firm connective tissue; numerous collapsed capillaries were also seen. The large vessels were injected, and several small hemorrhages were found near them, both at the periphery and in the interior of the ganglionic masses. Study of the condition of the capillary walls was impossible on account of the presence of the blood corpuscles within the vessel.

The history shows the condition of degeneration present in the greater portion of the arteries, and that the patient was suffering from chronic Bright's disease. His death resulted from cerebral hemorrhage, which is so frequently a consequence of contracted kidney. The autopsy records that the kidney had suffered at a period considerably prior to death, from interstitial inflammation. The much reduced size of the organs is, however, not entirely due to the contraction of the intertubular inflammatory tissue. This change had caused its usual effects in the tubular epithelium, and this portion of the organs had become markedly degenerated. The disease of the arterial system had contributed largely to the atrophy and degeneration found in all parts of the organ. The alterations in the kidney are, therefore, to be looked upon as due largely to atrophy and not solely to contraction. The interstitial inflammation was the first step in the morbid changes; the tubular epithelium suffered from the effects of the contraction of the inflammatory products, and both of these structures were further altered by atrophic degeneration caused by the atheroma of the arteries. That this interpretation of the condition of the kidney is correct, is evidenced by the flabby consistence of the organ as compared with its reduced size and weight.

The appearances of the ganglia prove that their connective tissue capsules are thickened, and that the changes in the periphery are accompanied by similar connective tissue hyperplasia in the interior, the fibres of which are coarse and firm, and there are present in this tissue new cellular elements, some of which are passing into fibrillar tissue, some or most of them are degenerating. The ganglionic cells are degenerated also, more particularly in their nucleus and nucleolus. The condition of the capillaries is also striking; the increase of connective tissue around their walls, and the evident degeneration of their tissue, evidenced by the occurrence of small hemorrhages, are especially to be noted.

Case V.—Wm. S. E., æt. 54, manufacturer, admitted to the Pennsylvania Hospital, March 6, 1878, in a nearly comatose condition, was unable to speak, but pointed to his pocket where letters were found directed to him. There was almost complete loss of power of his right arm and leg, the face was flushed, the conjunctival vessels were injected, and his pupils contracted. The first sound of the heart was heavy, the pulse regular, slow, and full. The radial arteries were markedly atheromatous. Later, he was able to speak a little, and made the statement that he felt well on leaving home in the morning, and while walking along the street became faint and fell unconscious. No further history could be obtained from the patient, partly from his stupid condition, but more especially on account of his difficulty in speaking. The next day he was more intelligent, but his speech was very thick.

8th. Rather duller. Bowels opened by purgative. The urine was passed involuntarily; the small amount collected was opaque, yellow-coloured, alkaline, sp. gr. 1017, and contained albumen. With caustic potash, the urine became thick, viscid, and stringy. No casts were found on superficial examination with the microscope; the determination of their presence was, however, very difficult, owing to the thick sediment. He died on the eighth day without striking changes of the symptoms.

Post-mortem examination, by Dr. Longstreth.—*Head.*—A large clot of blood, which originated from the left optic thalamus, filled the left lateral ventricle. The walls of the cerebral arteries were atheromatous.

Cavities.—The *peritoneal* and *pleural* cavities presented nothing especial to note. The *pericardium* contained a small amount of blood-stained serum, its vessels were injected, and there was a very fine layer of lymph on its surface.

Heart.—Right side relaxed, left moderately contracted; its cavities nearly empty. Its orifices were normal in size, and its valves competent. Coronary arteries rigid and atheromatous. The commencement of the aorta was slightly dilated, and showed marked atheromatous changes, making its surface uneven. The mitral leaflets were atheromatous, but presented a smooth surface. The aortic valves were not changed. The cavity of the left ventricle was of normal size, its wall measured, at mid-ventricle, 1½ inches in thickness, towards the apex much less. The muscular tissue was rather flabby but resistant.

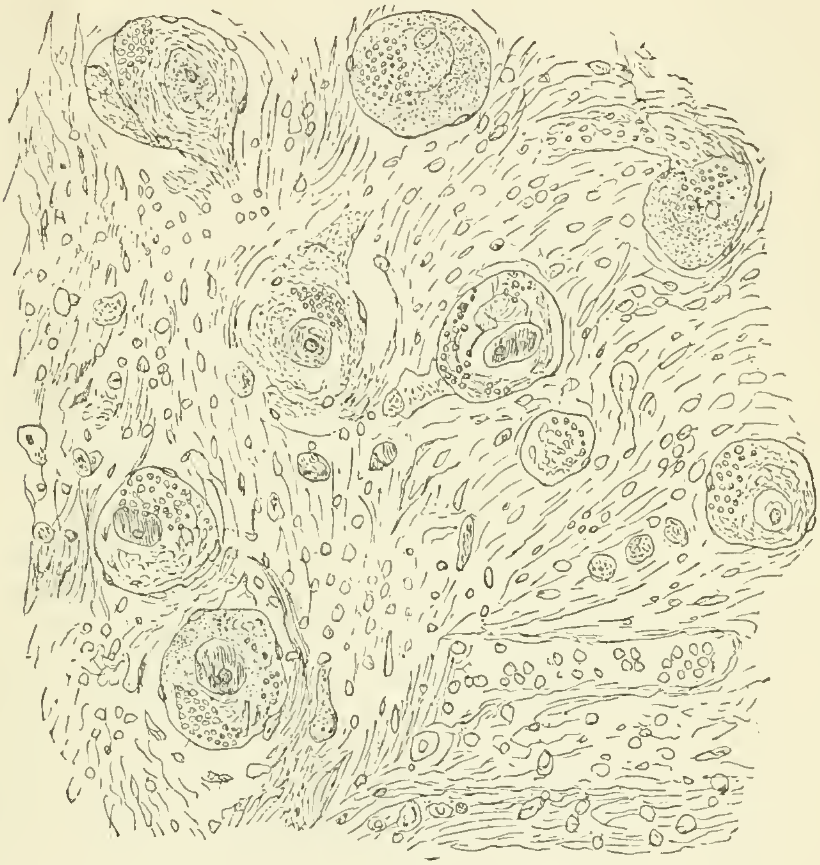
The *lungs* were emphysematous anteriorly, whilst posteriorly they showed deep congestions. The *spleen* was small, firm, had a nodular feeling. On section, the nodules appeared like areas of infarction. The *liver*, *stomach*, and *intestines* presented nothing especial to note.

Kidneys.—The left was small, not very firm, and slightly irregular in its outline. The capsule was opaque, thickened, and adherent, and on removal tore the tissue of the organ and left a highly granular surface, on which the stellate veins were distinct. The cortex was found much reduced in thickness, and its tissue was opaque and mottled. The organ had a distinctly urinous odor. Weight three ounces. The right kidney presented the same general characters. The bladder mucous membrane was swollen, and probably in a state of catarrhal inflammation of slight degree. Urethra not examined.

Microscopic Examination of the Renal Ganglia.—The connective tissue capsule of the ganglia was found moderately thickened and firm in parts, and contained within its meshes numerous cellular elements. The adipose tissue in it was abundant, and the vessels were not numerous, but some had very abnormal walls.

The ganglionic cells were irregular in their outline, some appearing shrivelled; their structure was markedly indistinct, and they contained abundant granular and fatty matters, and some also considerable pigment granules. Their nucleus was generally invisible, or some portion of its outline was invisible, from the accumulation of granules or fat. The nucleolus presented a dark outline or a black spot; it was rarely bright or shining. The connective substance of the ganglia had a coarse, highly granular or even fatty, striated, or fibrillated appearance. There were numerous cells in it, in some portions nearly all rounded, but of highly granular aspect, in other portions numerous elongated cells. These cellular elements stained imperfectly, and were faint or indistinct. The vascular element in the nervous masses was poorly represented in quantity, but the vessels seen in it presented marked thickening of their walls; there was hypertrophy of the muscular coats to a considerable degree, and of the connective tissue around them.

Fig. 3.



The ganglia cells are changed in outline, show many oil-globules, the nuclei form black dots or outlines. The connective tissue is fibrillated and contains very numerous new cellular bodies. X 350.

The atheromatous condition of the superficial vessels and the cerebral hemorrhage both indicated degenerative changes in the internal arteries of the body.

The microscopic sections of the kidney were spoiled through some defects in the mounting. Sufficient, however, is known of the minute appearances to enable us, in connection with the evident alterations seen by the naked eye, to classify this case with the others. The kidney showed atrophic changes as well as marked evidences of contraction and of degeneration of the epithelium.

The degeneration and atrophic changes in the ganglia were very evident both in the ganglion cells and the connective substance. It is also evident that at some period active changes were present in the latter constituent. The muscular coat of the arteries was altered in this case in the way which has been described in so many of the previous ones.

In group II., the group just described, the life history and the condition of urine and kidneys, show that either the renal disease was of a somewhat different type or that it was less advanced. In the first case the patient had led a life strongly predisposing to kidney disease; the kidneys were of the contracting variety, and the slightly swollen condition noted at the autopsy probably resulted from intercurrent, subacute changes brought on as the result of her recent injury. In the second case of this group, we have no report of the condition of the patient previous to admission ; death was due to cerebral hemorrhage. The kidneys were greatly contracted, but the microscopic examination, as well as the general condition of the organs, shows that marked parenchymatous changes existed in addition to the interstitial disease. In the third case the death resulted from cerebral hemorrhage also; the life history is exceedingly brief, and fails to indicate with any positiveness the existence of renal disease, and for this reason we have hesitated to include the case in this list. But so evident is it from the autopsy and examination microscopically of the specimens that kidney changes had been going on for a long period, that we have concluded to give the case along with the others with which it in other respects closely agrees.

In this group the renal ganglia are found strikingly altered, but to a different degree from those in the previous one. The adipose and connective tissues around the nervous masses, as well as around the kidneys, show similar changes to those already spoken of. The ganglionic cells are in all these cases markedly degenerated, but not to an equal degree to those in group I. The most striking difference between these cases and the previous ones is seen in the condition of the connective basis substance of the nervous masses. These cases all agree in showing this tissue filled to a greater or less extent with small cellular elements, having the usual characters of connective-tissue elements. In the previous group, as already pointed out, the active hyperplastic changes in this tissue were considered to be subsiding; the cellular elements had passed on to the formation of fibres, although a few were still to be seen. In this group of cases the cellular elements are in great abundance, some presenting themselves as round nuclear bodies, others as spindle-shaped cells, but the contractile changes of this tissue are much less marked than in the previous group. The display of vessels in and around the ganglia is very prominent, and is in co-ordination with the progress of the histological alterations of the morbid process, and in correspondence with the relative advance of the kidney changes.

Yet another group presents itself for examination, and in this *third group* we have more of the clinical features as well as the pathological changes in the kidney of catarrhal inflammation, mostly of the acute type, and we shall find the disease in the ganglia much less marked.

Case VI.—Charles O., æt. 28, single, bartender, was admitted to the hospital on Wednesday, February 6, 1878. He had always been in good health, but had been a hard drinker. On Sunday previous to his admission he awoke with a severe headache, having gone to bed the night before well. This condition continued, and, on the day before admission, he was seized with a chill, followed by vomiting, and was obliged to go to bed. He was very restless that night, and evidently feverish. He was constipated, and complained of loss of appetite, bad taste in the mouth, and his tongue was coated and dry.

On admission, the patient, who was very stout, presented a red, much swollen, markedly erysipelatous face. His temperature was 107° F.; in the evening the thermometer registered 104° F.

The next morning he was very restless, nauseated, tongue swollen and blistered. Temperature 107° F. His urine was cloudy, orange-coloured, acid, specific gravity 1020; it contained a considerable amount of albumen, and the microscope showed hyaline and granular casts.

8th. Complained of pain in back and limbs. The erysipelas spreading. Temperature 104° F.; pulse 146 per minute; extremely delirious. Tongue dry and very much furred. His hands were cyanosed.

9th. Very restless and delirious. Respirations had become stertorous during the past night; face livid and swollen. The urine was of a light claret colour, acid; specific gravity 1018, and contained about one-sixth its bulk of albumen. Died at 8.15 A. M.

Post-mortem examination, by Dr. Longstreth.—*Cavities.*—The *peritoneum* was injected, but without lymph. Many old adhesions of the *pleura.* The *pericardial* sac contained a little clear serum; the vessels on its surface were injected.

Heart.—Its right side was relaxed, and filled with blood and clots; its left side was contracted. Both the aortic and mitral valves showed morbid changes; the anterior flap of the mitral was thickened, and two of the aortic leaflets were adherent for a short distance near their insertion, and were thickened and opaque at deeper portions, and thinned in places near their free margins, almost to perforation. These changes were of old date. The whole of the endocardium of the left ventricle was thickened and opaque, and the left ventricular wall was hypertrophied.

The *spleen* was large; it showed several old infarctions of small size.

The *liver* was enlarged, moderately firm; its surface granular.

The *kidneys* were large, swollen-looking, smooth on the surface, and of regular outline. The stellate veins were very conspicuous, the capsule was tightly adherent and thickened. The cortical portion of the organ was much increased in thickness; its tissue presented a mottled, opaque aspect. The organs had a strongly urinous odor.

A microscopical examination of the kidney showed its tissues to be very much swollen. Its capsule, which in the fresh condition was tightly stretched over the swollen organ, and firmly adherent to it, was seen separated from its surface, and retracted at the sides of the section. The capsule was thickened, and composed of firm connective tissue; its vascular supply was inconspicuous, but its lymph spaces were large, and filled with granular and fatty matters, and some blood corpuscles. The larger vessels were enlarged, and their coats thickened, especially the outer coat; the muscular was highly granular, and its striæ indistinct. The Malpighian bodies were mostly large and swollen-looking; their capillary tufts appeared distended with blood corpuscles, but were greatly obscured by the granular cell elements around them. Their capsules were thickened and swollen, and were composed of firmer connective tissue than normal. They were pressed upon, and even indented, by the swollen tubes and tissue around them.

The convoluted tubes were irregularly dilated, and their basement membranes thickened and swollen. Their epithelium was highly granular and fatty, the nuclei invisible, and the outlines of the cells very indistinct; so swollen were the cells that they apparently closed the lumen of the tube. Many of the tubules were filled with blood-clots, in which, however, the blood corpuscles could not be distinguished. So frequent was the occurrence of these hemorrhages, that under the lower power (1 inch ob.) in many fields of the microscope, four or five tubes thus filled with blood could be counted.

The connective tissue between the tubules was markedly swollen and loosened, yet its amount and its firmness were increased above the normal. The swelling of the tissue was so great, and the presence of cellular and blood corpuscles so abundant, that it was not possible to state whether contraction of the organ had taken place previously to the acute process. No collapsed or shrunken tubules could be made out.

The capillaries were everywhere distinctly visible by their contents of blood corpuscles. These corpuscles varied in amount from a single row to masses consisting of several rows distending the vessel till it equalled the size of the tubule itself. The filling of the vessels equalled the picture presented by the most complete artificial injection.

Microscopical Examination of the Renal Ganglia.—The connective tissue covering the ganglionic mass was decidedly thickened, swollen, and firmer than normal; its vascularity was moderately increased, and considerable adipose tissue was present in it. It was firmly attached to the mass, and was encroaching upon and surrounding the ganglionic cells at the periphery; it was more abundant than normal around the nerve trunks, and penetrated with them into the interior.

The ganglionic cells were irregular in their outline, and generally did not show their structure with clearness and distinctness. Their substance was markedly granular, only slight fatty changes were visible, and the pigmentation was not conspicuous. In many of the cells the nucleus was obscured by the surrounding granular changes, but the nucleolus was distinct, appearing as a black outlined spot.

The connective substance of the ganglion presented a swollen, highly granular, and striated appearance, and was increased and firmer than usual, and the ganglionic cells appeared partitioned off in groups by bands. This tissue contained a considerable number of rounded and elongated cells, but they were in a highly granular condition, and stained but poorly. There was seen to be some retraction of the tissue around the ganglionic cells, yet the spaces were not wide, and frequently contained granular material or small granular cells. The nuclei of the ganglionic cell-walls showed in some cases very distinctly.

The capillaries in the interior of the ganglia were conspicuous, and usually filled with blood corpuscles; in many cases they appeared of large size, and over-distended; but others were seen which had thickened tissue around them, and were evidently shrivelling; no hemorrhages were visible.

This patient was admitted with a severe attack of erysipelas, from which alone it is not probable that he would have succumbed had his organs, especially the kidneys and liver, not already been affected by morbid changes. The urine contained a very considerable amount of albumen, and the microscopic examination of it, made only once, showed cylinders of a clear glassy appearance, inclosing, however, very many small granules. It is probable, from the colour of the urine, and condition of the kidney as exhibited by the microscope, that on the last day blood and epithelial casts would have been found.

The microscopic appearances of the kidney, taken in connection with the drinking habits of the patient, show that the organs were diseased prior to the attack of erysipelas, and this change consisted in a slight alteration of its vessels, and an increase of its connective-tissue constituents. It is probable, also, that the epithelium was also affected, as the renal phenomena were in excess of those usually seen in cases of uncomplicated erysipelas, though albuminuria of moderate or slight amount is the rule in this condition.

In the renal ganglia the changes were of moderate degree. The ganglion cells were granular, but not fatty. The connective tissue was increased in amount, and firmer than usual, but the cells of this tissue showed but slight active changes. The vascularity of the nervous masses was increased.

Case VII.—James E. K., coloured, æt. 29, was admitted March 25, 1878. The patient had suffered from intermittent fever many times during his life, but was never confined to bed by the disease; and did not think his general health was materially impaired thereby. During the last year he had been perfectly free from it, and had been well until five weeks before coming to the hospital, when he noticed a change in the secretion of the urine, and that he passed apparently more than usual; he became dull and listless; had some headache. Two weeks later his eyelids and face began to swell, afterwards his lower extremities, and finally his whole body became œdematous.

The urine was of pale yellow colour, acid, sp. gr. 1017; with heat and nitric acid there was precipitated about two-thirds its bulk of albumen. The microscope showed granular, epithelial casts in great number, and some hyaline and blood casts, together with free blood corpuscles. On the 1st of April he suffered from severe pains in both shoulders with increased temperature (104·5° F.), also from great tenderness to pressure over nearly the whole body, and severe pain in the lumbar regions. The general œdema decreased, and the pains lessened. On April 8th there was a failure in the secretion of urine, and shortly afterwards an abundant effusion occurred in the pleural cavities and pericardium. On the 17th of April the right leg was red and painful, and a day or two later it presented the appearance of erysipelas; subsequently an abscess formed at this part, and on two occasions large amounts of pus were withdrawn by aspiration. He gradually lost strength, the dyspnœa increased, respirations were 40 per minute. The condition of the urine remained about the same, the casts later were mostly granular and fatty. The patient died May 11, 1878.

The *autopsy* showed a large amount of inflammatory effusion in the *left pleural cavity;* over the upper part of the lung the pleural surfaces were firmly adherent. The *right pleural sac* held less inflammatory material than the opposite side, but the lower lobe of this lung was markedly compressed. The *pericardium* contained a large quantity of serum and lymph. In the *abdominal cavity* was considerable serous effusion, but the peritoneum showed no evidences of inflammatory action. The valvular apparatus of the heart was normal, and its muscular tissue presented no marked alteration, except at the pericardial surface.

The kidneys were large and swollen; their outline was regular and their colour pale. The general appearance was such as usually characterizes the second stage of acute Bright's disease of the catarrhal type.

The other organs showed nothing especial to notice.

Microscopic Examination of the Kidney.—The surface of the *kidney*, as seen in the microscopic section, is smooth and regular. The capsule presented a swollen, loose appearance, but there was no increase in the firmness or the amount of its connective tissue. Its vascularity was not augmented; its lymph spaces contained considerable granular matter.

The lumina of the large vessels at the base of the pyramids showed smaller openings than usual, and were evidently pressed upon by the swollen tissue around them. Their internal coat was much folded and puckered, but the middle and external coats were not altered, except by a moderate swelling of the connective tissue at the periphery of the vessels. The Malpighian bodies appeared swollen and enlarged; some of them showed their capillary tufts injected, others were empty and their cellular elements were highly granular and fatty. Their capsules were swollen and wider than normal, but the connective tissue was loose, and not increased in amount; in some were present granules and fatty matter.

The epithelium of the convoluted tubes was generally highly granular and fatty, and so swollen that it nearly or quite closed the tube; in other tubes, a much smaller number of the epithelial cells presented more nearly normal conditions, and were evidently newly developed, having relatively large nuclei. The nuclei of the majority of the cells were greatly obscured by the granular and fatty changes which had taken place. Many of the tubes were clogged with granular and fatty debris. The basement membranes of the tubules were everywhere swollen and irregularly distended, and the interspaces between them were widened and the connective substance highly granular, but not increased in amount or firmness. The capillaries in many parts were injected with blood corpuscles, but in other parts were empty, the one or other conditions depending on the presence or absence of the swollen cells within the tubules.

It was evident from a general survey of the cortex that its thickness was increased, and that this swelling was so great that the capsule was much stretched. In some parts of the cortex the acute process had subsided, and the degenerated epithelium of the tubules was being replaced by new elements; in other portions the tubules were still clogged by degenerating cells and inflammatory products. In some parts the circulation was returning to its normal condition, or was even in excess, and in others it was hindered by the morbid condition of the tubular epithelium and of the adjacent parts. In the tubes of the medullary cones numerous fatty and granular casts were seen occupying a portion of their length; in this part the bloodvessels were greatly overfilled with blood, and here, too, the connective tissue between the tubes was swollen.

Microscopic Examination of the Renal Ganglia.—The connective tissue surrounding the ganglion mass was comparatively of small amount, loose in character, and slightly connected with the nervous tissue, and was much less firm and coarse than in most of the other cases. It appeared somewhat swollen and œdematous, and where it passed into the substance of the ganglion around the bloodvessels, or accompanied the nerve trunks especially, its cellular elements were increased. There was also an increased amount of adipose tissue found in it.

The ganglionic cells showed distinctly and clearly, unobscured by the changes around them, or in their interior. Many of them exhibited double nuclei and nucleoli ; about two-thirds of the cells presented no alteration, except an increased granular change with an occasionally visible fatty granule, whilst the other third were markedly granular and fatty, especially around their single nucleus, which, in these instances, was nearly or quite invisible.

The tissue of the ganglion had a finely granular, somewhat striated appearance ; at no part were there any coarse fibres, or any penetration of the ganglion mass by the ingrowth of connective tissue bands from its capsule. The basis substance showed a moderate number of small round cells scattered through it, and a fewer number of elongated ones. There were no cleared spaces around the nerve-cells as witnessed in other specimens. In general, the aspect was that of an evenly spread basis substance, having numbers of small round or spindle, strongly stained cells scattered through it, and in which the plump and regularly rounded ganglion cells rested as in a bed. Vascularity and injection of the vessels, both at the periphery and in the interior, were deficient in a very striking degree.

This patient suffered from catarrhal (parenchymatous) nephritis, which in the early stages was of a mild type and rather slow in its advance. The symptoms were noticed five weeks before his admission to the hospital, and during this period he was without proper care. The progress of the disease was unfavourable, being complicated with pericarditis and pleurisy and with abscess of the leg. At the autopsy the kidney presented the appearances usually seen in the large white kidney of Bright or in Grainger Stewart's second stage of acute nephritis. The microscopic examination of the organs showed a swollen condition of the connective tissues. The vessels and the connective-tissue portions of the organ showed only such alterations as are dependent on acute disease. The epithelial cells of the tubules were highly granular and fatty, and to these elements the morbid changes were principally confined. The casts in the tubes were of the same character as those in the urine during life. The ganglion cells in this case were comparatively little altered ; in the connective substance of the nervous masses, there was no filbrillation of the tissue, and the cellular elements of this part were but little increased in numbers and showed but slight hyperplastic or formative changes.

Case VIII.—Sabilla R., æt. 16, coloured, single, domestic, admitted to the Pennsylvania Hospital January 26th, 1878. The patient had always been healthy until two years previous, when she had an attack of rheumatism, affecting the ankles and knees ; this attack was not so severe as to confine her to bed, but since she has noticed slight palpitation of the heart from exertion. The previous winter she has been much exposed to cold and wet. Nine days before her admission slight pains in the ankles began, and six days ago almost every joint of the body was painful, and in addition she has had pain in the cardiac region and dyspnœa, and has gradually grown worse.

On admission, her temperature was 105° F., pulse 136 per minute, respiration 72, panting and shallow. There was some pain and a little swelling of both hands. Owing to the rapidity of the heart's action, its physical examination was difficult and uncertain; there seemed to be an apex systolic murmur and a friction sound over the body of the heart, confined to a very small area. The heart appeared displaced.

Urine note. Jan. 27.—Cloudy, acid, sp. gr. 1010, albumen in small quantity. The microscope showed pus (?) corpuscles, squamous and pavement epithelium, and a few granular and hyaline tube-casts.

The patient gradually sank and died Feb. 5th, death being preceded by marked evidence of a pulmonary complication.

Post-mortem examination, by Dr. Longstreth.

Cavities.—Considerable serum was found in the *abdominal* cavity, containing large masses of fibrin. No evidence of peritonitis. The *pleural* cavities showed numerous old and recent adhesions, serum and flocculent lymph, especially at right base.

The *pericardium* was distended with serum and recent lymph; the lymph was half an inch thick, pretty firm in character and adherent to both the surfaces.

Heart.—The right side distended, the left firmly contracted. Both the mitral and aortic valves showed numerous recent vegetations of small size along the line of contact of their leaflets, which were swollen and opaque. The heart weighed 12 ounces av.; its left ventricular wall measured $\frac{3}{4}$ inch in thickness.

The *lungs* were compressed by the pleural effusion, and there were areas of pneumonic consolidation in the right lower lobe.

The *spleen* showed several small, recent embolic patches.

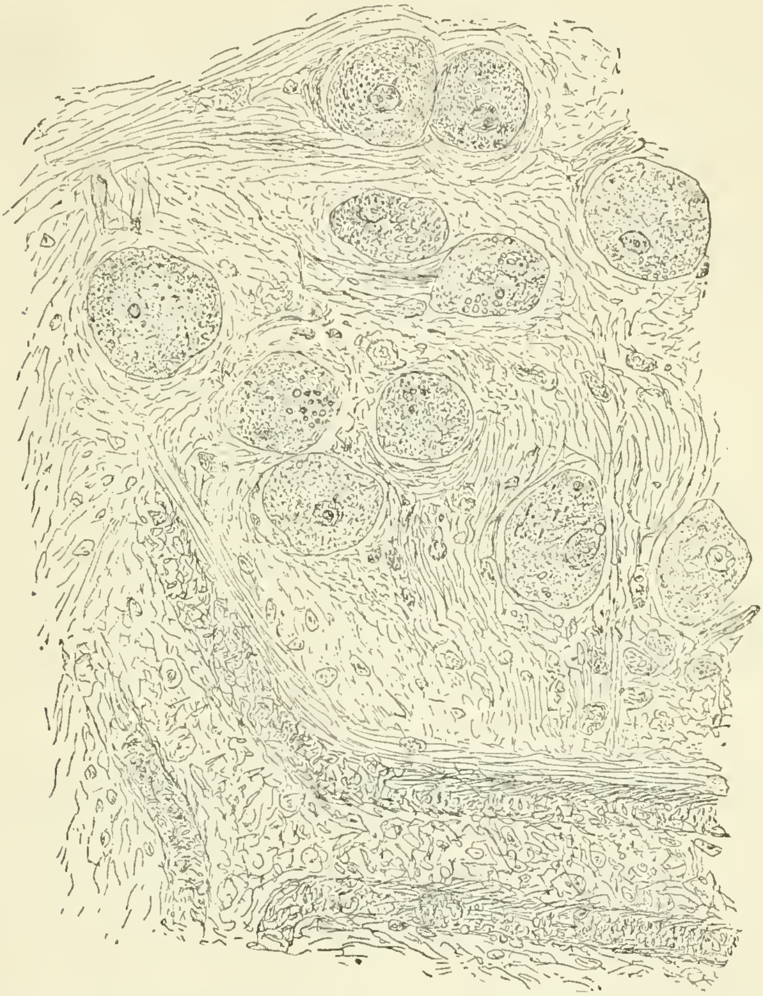
The *kidneys* were not much enlarged, appeared swollen, and were of doughy consistence. The capsule was slightly thickened and more firmly adherent than normal, but on removal left a smooth surface, showing the stellate veins distinctly. On section, the cortex was swollen and increased in thickness. It was homogeneous looking and opaque.

The microscopic sections of the kidney from this case were lost, and a particular description of it cannot therefore be given. The condition present was that of cloudy swelling of the tubular epithelia and also an increase of the intertubular connective tissue. The microscopic examination was carefully made at the time of the autopsy, but as the specimens were lost we have only appended this short note of the condition of the kidney.

Microscopical Examination of Renal Ganglia.—The connective-tissue covering of the nervous mass was considerably thickened, composed of firm bands, swollen and contained considerable adipose tissue. The vessels in it were larger and more numerous than normal, their coats thickened, especially the muscular layer, but they were empty of blood.

The ganglionic cells were pretty regular in their outline, though perhaps generally less so than those represented in the drawing; many were quite irregular, looking notched and shrivelled. They were mostly highly granular, and many showed fatty changes. The nucleus was as a rule distinct, although obscured by the changes in the cell-body; but occasionally it was either quite invisible or some portion of its outline was lost. In some of the nuclei black granules were present. The nucleoli showed distinctly as black outlined circles or as black dots.

Fig. 4.



The cells are regular in outline, show much granular change and a few fatty particles. The connective substance is swollen and firmer than normal, and only a few new elements are present. The arteriole has its muscular coat hypertrophied and the connective tissue around it is increased. × 350.

The connective substance of the ganglia presented a loose, swollen appearance, its fibres were moderately coarse and loosely collected, but they passed band-like through the nervous mass and partitioned off the cells more or less completely into irregular aggregations. Its tissue was highly granular in places, in other parts between the fibres was a hyaline basis material, which, especially around the vessels, gave an appearance not unlike myxomatous degeneration, although the condition was evidently not of such character. A moderate number of cells were present in it, both rounded and elongated, which stained but poorly and were mostly granular and fatty. The vascularity of the ganglia was obviously increased. Numerous capillary vessels were present having thick swollen walls or surrounded by an increased amount of connective tissue. Some of them were dilated, others were collapsed. They were empty of blood, and no hemorrhages were seen.

We think it may be concluded that the clinical record of the urine shows that the patient had suffered from renal disease previously to the time of her admission with the acute illness of which she died. In fact, it was a question during life whether the pericarditis and pleurisy were not of renal origin. Although the patient's story on admission indicated an acute attack of rheumatism, the symptomatic evidence of it was not strong, and by far the greater difficulty under which she laboured was the pericarditis, combined with pleuro-pneumonia. The condition of the kidney is confirmatory of the clinical evidences of renal disease prior to her last illness. That albumen should be present in the urine and that cloudy swelling of the tubular epithelium should result from the high temperature are not unexpected conditions. But the thickened capsule and the increase of the intertubular connective tissue show that previous disease had existed in the kidney.

Some of the alterations found in the ganglia were the results of such changes as come to all the tissues of the body in acute diseases attended with high temperature. The swollen condition of some portions and part of the granular changes are to be interpreted in this manner. In addition to these, we have irregularity of outline, a marked granular and a fatty degeneration of the ganglion cells. The increased cellular elements in the connective substance of the ganglia and increase of the fibrous and connective tissue, both in the periphery and in the interior of the nervous mass, show changes not due to any acute process.

CASE IX.—Mary W., æt. 26, coloured, married, domestic, admitted to the Pennsylvania Hospital, November 12th, 1877. Her father died of consumption; her mother of "dropsy." The patient had always been healthy; she had been married six years and had one child. Two months previous to her admission to the hospital, she had a severe attack of "biliousness," for this she took a strong cathartic, which produced a very free diarrhœa, and to this she ascribed her illness. Soon after this time she began to complain of malaise, headache, loss of appetite, and nausea, all of which gradually increased, and during the latter part of the month prior to her admission she was compelled to give up her work. About this time, she had a continual diarrhœa, and a cough began, attended with abundant mucous expectoration, which soon became blood-stained. Up to the time of her admission she had had no œdema of the feet or other symptoms of kidney disease; she had previously been much exposed to cold and wet.

On admission, there was considerable fever, no hebetude, tongue coated with moist whitish fur. Abdomen not tympanitic, considerable diarrhœa, the passages of a very fetid character, no vomiting. Cough with bronchitic blood-stained expectoration, resonance over both lungs not impaired, mucous râles on both sides posteriorly and on the left anteriorly.

Urine, clear, yellow, acid, specific gravity 1021. Albumen in small amount and numerous granular and hyaline tube-casts.

14*th*. Temperature 105° F.; some dyspnœa. Impairment of resonance at right base, other phenomena the same.

16*th*. Expectoration contained more blood. Hebetude and subsultus tendinum.

18*th*. Expectoration less bloody. Diarrhœa and other phenomena continued the same. Subsultus increased. Slight delirium. Urine scanty. Temperature 105½° F.

19*th*. Urine contained one-eighth albumen, specific gravity 1020. Large amount of epithelial cells and granular tube-casts and some free oil globules. Subsequently, the condition of the urine was not to be accurately determined, as the patient was delirious and emptied the bladder involuntarily, but the amount increased. The physical signs in the lung indicated a catarrhal pneumonia. The diarrhœa continued. The diagnosis was typhoid fever and catarrhal pneumonia. Died, November 24th, 1877.

Post-mortem examination, by Dr. Longstreth.—*Cavities.*—The *peritoneum* was smooth, no increase of serum and no lymph or recent adhesions. The *pleura* and *pericardium* showed nothing especial.

Heart.—Right side distended and relaxed, and contained large firm clots; the left ventricle flabby and empty, and slightly dilated. The mitral valve showed a spot of atheromatous degeneration, and the commencement of the aorta showed similar changes. Weight, 8½ ozs.

The *lungs* showed the characteristic changes due to catarrhal pneumonia. *Spleen* was small, its consistence flabby, pale, its tissue soft. *Liver* was swollen, moderately congested, its tissue less resistant than normal, and appeared opaque and homogeneous (cloudy swelling). *Intestines.* Several of Peyer's patches were deeply excavated. The mesenteric glands near by were enlarged and surrounded by an area of congestion.

Kidneys large, smooth, swollen looking, and their consistence was flabby. The veins on their surface conspicuous. The cortex was greatly thickened, opaque, and mottled; the capsule somewhat swollen, easily separated, and leaving the surface of the organ smooth and regular. The kidneys had a markedly urinous odour. Their structural parts presented microscopically nothing of note, except the tubules and Malpighian bodies.

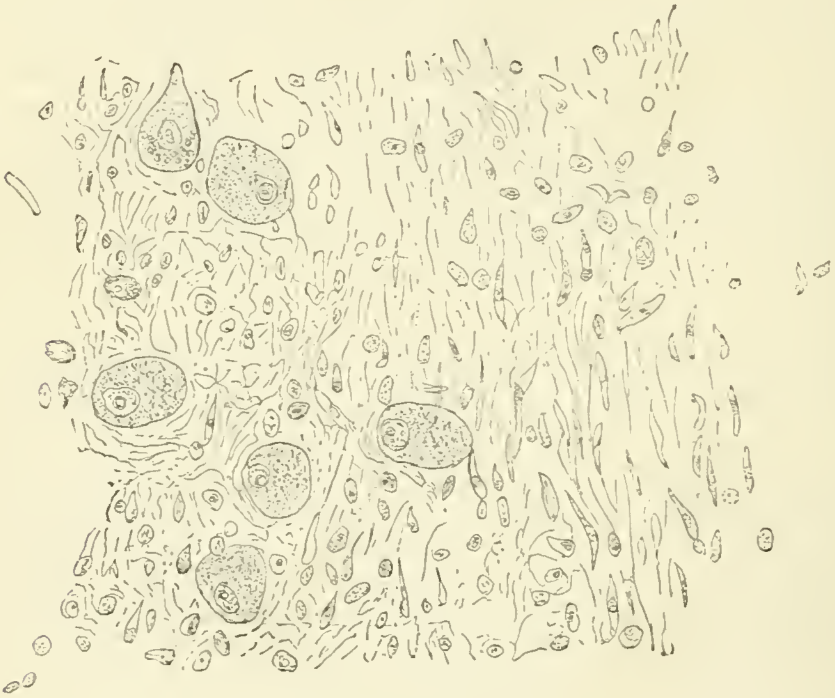
All the parts of the organ were much swollen. The Malpighian tufts, with their cellular elements, closely filled the capsules; the cells were very highly granular, and prevented the recognition of the capillaries. A few blood corpuscles, however, could be distinguished in the tufts. The basement membranes of the tubules were swollen, and the tubes were irregular in outline. The epithelial cells, mostly retained in position, were very highly granular and fatty, and so swollen that they nearly filled the lumen of the tube; their nuclei were generally invisible. Many tubes were clogged with granular and fatty matters, or oil globules.

Microscopic Examination of Renal Ganglia.—The connective tissue envelope of the nervous mass showed little or no evidence of any abnormal condition. It was composed of fine, loosely matted fibres, devoid of adipose tissue; it exhibited no abnormal vascularity, nor its vessels changes of their coats. There was no increase of connective-tissue cells, and no increase of connective tissue about the nerves either along their trunks or at their entrance, or within the ganglia.

The ganglion cells were distinct, of regular outline, and showed but little evidence of structural changes. Their bodies were mostly free from granular or fatty alteration, and but little pigment was noticed within them. Their nuclei were always distinctly seen, although in numerous instances a few granules were seen within them or on their border. The nucleoli were clear and shining.

The connective substance of the ganglia was considerably altered, though to a very much less degree than in any of the other cases. It was composed of a clear, transparent, very slightly granular and barely visible finely striated basis substance, in which were seen a considerable number of mostly elongated bodies and a few rounded cells. These elements were exceedingly delicate in their character, and not granular or fatty; they stained distinctly though not deeply. The nervous masses showed no aggregation of the ganglion cells, and no appearance of being partitioned off by bands or masses of connective tissue as was so distinct in many of the other cases. Doubtless many of the bodies depicted in the drawing were nerve fibres, and the cellular bodies were evidently of a recent character and exhibited no progressive changes. The whole structure was much more delicate than in the drawing.

Fig. 5.



The nerve-cells present more nearly normal aspects. The connective basis substance of the ganglia does not show any very distinct alterations; the cellular elements are increased, but some of those bodies are probably nerve-tubules and not new morbid products. × 350

From the history of the case, the pathology of the attack is not entirely clear; that she had typhoid fever, and that this was complicated with a catarrhal pneumonia, is quite evident. Whether the renal disease was of prior date, or whether coincident, is very uncertain. We are of the opinion that the kidney disease was of recent date. The fatty changes of the renal epithelium were probably produced through the influence of the profound blood changes due to the typhoid poison.

The renal ganglia were little altered, the principal appearance to be regarded as abnormal was in the connective substance of these bodies, and these changes were of recent origin, and they were very slight.

In group III. the type of disease is different from the cases in both the previous groups; albuminuria is a marked phenomenon, and the renal disease was not advanced, yet probably the immediate cause of death, except in the last case. In Case VI., suffering from erysipelas, the evidence of pre-existing renal disease is plain. The condition of the kidney, as seen by the microscope, shows that interstitial changes had occurred previous to the incoming of the acute parenchymatous disease accompanying the erysipelas. These interstitial changes were not of such character as to produce contraction of the organ, or, at least in the presence of the tubular alteration, the contraction had been overcome and was not visible; the increase of intertubular connective tissue was however sufficient to markedly interfere with the renal functions, and this attack, which but for this condition, would probably have had a favourable issue, resulted in death. In Case VII. the history and the condition of the organs show a type of disease different throughout from any of the previous cases. The alterations in the kidney are those of acute catarrhal inflammation; there is slight disease of the bloodvessel walls, but no evidence of chronic interstitial changes. The case was complicated, however, with inflammatory disease of the serous membranes, phenomena much more common in connection with the contracted kidney than with kidneys presenting the type of disease which these organs exhibit. In Cases VIII. and IX., the evidence of kidney disease prior to the fatal attack is much less than in any of the other cases; and in Case IX. it can with great certainty be concluded that no renal mischief was present previous to about a fortnight before admission.

In this group, the changes in and about the ganglia were much less marked, or in some cases so slight as not to be appreciable; the connective-tissue increase and the accumulation of fat, both here and around the kidney, were noticeable conditions, and in respect to the ganglia is shown by the microscopic examination. In this group the ganglion-cells were markedly granular, but the absence of fatty degeneration separates the cases very distinctly from those in the previous groups. The condition of the connective basis substance of the nervous masses conforms to a recent hyperplastic alteration of this tissue, and corresponds to the recent or slightly marked changes found in the ganglion cells and with the type of the renal disease in this group. The vascularity here is likewise in correspondence with the tissue alterations.

In Case IX., the connective tissue alterations are very slight and are those due to acute conditions. The ganglion cells likewise show little alteration, and the basis substance is devoid of any evidence of contractile changes such as were seen in most of the previous cases.

We have thus, we think, by a series of cases arranged in different groups according to the prominence of the changes, proved that in Bright's disease the renal ganglia are materially altered, and we refer to the drawings for a verification of the statement.

The difficulty of the inquiry was considerable. We have searched carefully the sources from which we expected to derive information concerning the microscopic appearances presented by the ganglia, without, however, obtaining much knowledge. A great deal has been written on the structure of the ganglionic cell, its nucleus and nucleolus, its nerve fibres, and its connection with the spinal system of nerves, as well as the fibres distributed from it, as a centre, to the various organs; and in giving our description of the condition of these bodies, the typical form, as shown by Bidder,[1] Arnold, Fräntzel,[2] Lubimoff,[3] and others, has been carefully held in view. But of the normal appearances presented by the tissue of the ganglia lying between the ganglionic cells, and in which these bodies rest as in a bed, and through which the nerve fibres pass to be distributed peripherally, we have found no satisfactory description and no plates which represent the normal condition. Key and Retzius,[4] however, have shown very beautifully the lymphatic spaces of the ganglia, and Ranvier[5] has studied minutely the condition of the nerve fibres. Of the pathological conditions of the sympathetic nervous system, Poincare and Bonnet[6] have described the changes occurring in general paralysis, Voisin[7] in certain psychical disturbances connected with disease of the abdominal organs, and Petrow[8] in constitutional syphilis. Lubimoff[9] has made the most extensive studies of the general morbid conditions occurring in the various divisions of the grand sympathetic and in the component parts of the sympathetic ganglia. Yet none of these authors, or any others who have worked in this field of research, have traced out any definite connection, in the relation of cause and effect, between the ganglionic changes and the morbid condition of any organ to which the affected ganglion stands in the relation of a nerve centre. Among the 250 cases in which Lubimoff examined the condition of the sympathetic, he mentions only two of kidney disease (nephritis diffusa), but gives no details of the cases or of the appearances presented by the ganglia, and does not connect the nervous changes directly with the renal disease. Our endeavour has been to discover whether anatomical alterations are to be found in the particular part of the nervous system directly connected with the renal apparatus, and what is the nature of this alteration.

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[1] Die Nervi Splanchnici und das Ganglion Cœliacum. Arch. f. Anat., Physiol. und Wissenschaftl. Med., 1869, s. 472.

[2] Beitrag zur Kenntniss von der Structure der spinalen und sympathischen Ganglienzellen. Virchow's Arch., Bd. xxxviii.

[3] Embryologische und histogenetische Untersuchungen über das sympathische und centrale Cerebrospinal-Nervensystems. Virchow's Arch., Bd. 60 s. 217.

[4] Studien in der Anatomie des Nervensystems. Arch. für Mikroscopische Anatomie, Bd. ix.

[5] Recherches sur l'histologie et la physiologie des nerfs. Archive de Physiologie Normale et Pathologique, 1872.

[6] Recherches sur l'anatomie pathologique et la nature de la paralysie générale. Annales médico-psychologiques, 1868, p. 185.

[7] L'Union Med. 1872, No. 54, p. 650.

[8] Ueber die Veränderungen der sympathischen Nervensystems bei constitutioneller Syphilis, Virchow's Arch., Bd. lvii. s. 121.

[9] Beiträge zur Histologie und pathologischen Anatomie des sympathischen Nervensystems. Virchow's Arch., Bd. 61, s. 145.

We think it cannot be denied that a morbid condition hitherto not described has been shown to exist in the ganglia—a condition to be seen as distinctly with the unassisted eye as the abnormality of the kidneys themselves, and the microscopic examination of the ganglia has confirmed the existence of the changes and has shown that the histological alterations have been in some degree proportional to the amount and the duration of the kidney disease.

The question is then no longer as to the change, but as to its meaning. Is it simply consequence? is it part of a general degeneration which affects kidney and other parts of the body; or is it the starting point of the kidney disorder? Is it concomitant, is it cause? We do not think it consequence, for the alterations are discernible in the ganglia before any other tissues, except the kidneys, are markedly affected. Whether concomitant or cause is very difficult to answer. But we believe that it will be found to be the latter, at least for some of the forms of Bright's disease, and that the changes, especially in the type of the disease called interstitial nephritis, or contracted kidney, will be recognized to be linked to the changes we have indicated in the ganglionic cells, in the connective tissue and in the bloodvessels. Whether all forms, or to what extent the varied acute and chronic conditions classed under Bright's disease present these ganglionic changes and are dependent upon them, is a matter for future research; and we may, through this research, find an additional means of clear distinction between the renal maladies.

Speaking generally, and having more particularly the interstitial nephritis in view, we think that the physiological pathology of Bright's disease is to be interpreted in the following manner: the specific cause, whatever may be its unknown form or character, acts in such a manner on the ganglion cells, presiding as centres of innervation to the kidneys, and whose fibres distributed to the vessels of these organs regulate not only the calibre of the vascular trunks, by changing the state of contractions of their muscular fibres, but also probably the conditions of osmotic action between the blood and the renal tissues, that the collective phenomena, known as Bright's disease, are brought about. In the form of interstitial nephritis these phenomena present themselves as a condition of inflammation of the connective-tissue portions of the kidney, and with this change, we see the alterations of the muscular fibres of the arterial walls. The subsequent lesions in the kidney are the results of the further development of the inflammatory products and their cicatricial contraction, and are not the special effect primarily of the morbid condition of ganglion cells. The alterations of the connective basis substance of the ganglia, are probably of the same nature as the hyperplasia of the connective tissue of the kidney, and like this tissue, it undergoes similar developmental changes and finally contraction, which latter morbid process reacts on the ganglion cells, producing further degenerative changes in these bodies. The early stage of the active, hyperplastic, process of the connective tissue of the ganglia, attended, as we have shown it to be, by increased vascularity, produces an irritative condition of the ganglionic cells which reinforces the original active cause of the disease.

We cannot bring this paper to a conclusion without referring to two points which have an almost self-evident bearing on the affection we have shown to exist in the sympathetic ganglia; one is the condition of the minute vessels, both in the kidneys and elsewhere, which has attracted the attention of so many observers; the other, the yet more commonly known hypertrophy of the heart that is found in connection with Bright's disease.

With reference to the condition of all the smaller arteries of the kidney, when this organ is contracted, when, therefore, it has suffered from interstitial nephritis, all authors are agreed that thickening of the walls is present. Some observers, as Gull and Sutton, state that the thickening is due to a "hyalin-fibroid substance," deposited "chiefly outside the muscular layer." George Johnson, on the other hand, had previously affirmed that the thickening is due to a true hypertrophy of the muscular coat of the vessels. These authors have shown that a similar change affects the arteries of other organs of the body. Many observers have confirmed the existence of thickening of the arteries of the kidney, and have ranged themselves on one or the other side in reference to the nature of this change. Gull and Sutton differ materially from George Johnson in relation to the extent or parts of the vascular system involved in the change; their theory they have named "arterio-capillary fibrosis," implying by the name that the capillary vessels show the hyalin-fibroid changes as well as the small arteries, while Johnson's view necessarily limits the change to the arteries, which alone have muscular fibres in their wall.

From our own observations we have no hesitation in concluding, as is shown in the description of our specimens of this series of cases, as well as from the examination of very numerous other cases by comparison with healthy arterioles, that in cases of contracting kidney, the muscular tunics of the vessels are hypertrophied, especially and invariably in the kidney, and also in other organs of the body, even when the process of contraction is not far advanced. But we do not wish to enter into the discussion of this question, contenting ourselves with the statement just given of our belief concerning the true condition of the arterial changes—an opinion formed long previously to the investigations with which we are at present concerned. We wish, however, to point out the causal relations which we believe the muscular hypertrophy of the vessels has to the alterations found in the ganglia.

We do not think it rational to suppose that the muscular fibres contract, for the purpose of lessening the supply of blood to the damaged kidneys, or for any other reason, from any power inherent in themselves. Such a notion implies a degree of intelligence or self-originating action which has never been attributed to muscular fibres, either of the voluntary or involuntary set; and, it seems to us, it is illogical to confer upon the muscular coats of the arterioles a power of self-action, which, in case of contracted kidneys, is sufficient to determine a substantial hypertrophy. The cause of this hypertrophy must be sought, since such action of the muscular fibres is not a voluntary one, in the ganglionic centres. Evidently the causal conditions must be general ones, because not only are the effects seen in both kidneys, but in many instances the vessels of other parts of the body are influenced; they must be causes that act on not only the renal plexus in particular, but also on the other ganglionic centres. One cause may be of such a nature that it operates through the general nervous system, for it is a well-ascertained fact that grief, and sorrow, and nervous depression are potent sources of Bright's disease, especially of the contracting kidney. Again, the disturbance may come through the blood; for the nutrient fluid supplying the renal plexus, if altered, will produce a condition of irritation of the ganglionic cells, with subsequent tissue-changes alike in the ganglia and in the kidneys, and give rise to the phenomena of interstitial nephritis—hyperplasia of the connective tissue, and hypertrophy of the vessels. We regard, then, both the tissue-changes and the hypertrophy as essential and connected parts of the same picture. Both conditions are presided over, and directed by, the sympathetic or vaso-motor centres.

Let us consider, in the next place, the hypertrophy of the left ventricle of the heart in its relation to these vascular changes, and also the place which this hypertrophy holds with reference to our theory. Hypertrophy of the heart, coexistent with chronic renal disease, was first alluded to by Bright in the first volume of *Guy's Hospital Reports*, and he expressed the opinion that the ventricular hypertrophy was due either to the direct action of the altered blood on the heart muscle or to the effect of this fluid on the minute and capillary circulation, so as to render greater action on the part of the heart necessary to force the blood through the distant subdivisions of the vascular system. Since Bright's time most pathologists have consented to this view of the causation of the cardiac hypertrophy, and have agreed that it was present in the majority of cases. But from the time that an essentially different pathological condition has been shown to exist in contracted kidneys and in the large white kidney, it has been pointed out that in the latter form of chronic Bright's disease the ventricular hypertrophy is exceptional.

Johnson was the first to offer a consistent theory for the cardiac hypertrophy with contracted kidney, founded on a physiological basis derived from a minute study of the anatomical parts. Gull and Sutton, while denying the vascular hypertrophy, and thereby removing the antagonizing element which, according to Johnson's theory, is the cause of the cardiac hypertrophy, state that they "have particulars of nine cases in which the kidneys were very contracted and the heart was free from hypertrophy." Unfortunately, they do not refer us to the particulars of these cases. Johnson states that he has "observed a constant relation between hypertrophy of the arterial walls and hypertrophy of the left ventricle of the heart;" he also says that in the "majority of cases of contracted kidney the left ventricle is thickened," implying, therefore, that the cardiac hypertrophy is not invariable. In the waxy kidney, too, Grainger Stewart has shown that hypertrophy of the heart was present in only a small percentage of the cases.

We do not think that the heart hypertrophies simply, as has been assumed, because of the opposition the passage of blood meets with in the renal circulation. We are inclined to believe that the hypertrophy of both the heart and the vessels is to be traced to a central origin; in one case to the cardiac ganglia, and in the other to the renal. The same statement applies to the changes in the vessels and tissue in other organs of the body, and when they, in their turn, are affected, the ganglia which preside over them as centres most probably have been acted on in a similar manner as the ganglia already mentioned.

If cardiac hypertrophy invariably resulted from arterio-capillary narrowing, the change would certainly be vastly more common than it is. If simple narrowing were the cause, surely in the large white kidney the pressure on the capillary circulation is greater than in the early stages of contracted kidney, and therefore cardiac hypertrophy should be a marked feature of this form of chronic Bright's disease. Experience shows that it is not. In respect to the kidney itself, the secreting gland structure is just as much damaged, nay more so, in the large white kidney as it is in early stages of the granular kidney in which the vascular hypertrophy has occurred. There is, therefore, a deeper, a more remote origin of the vascular and of the cardiac hypertrophy; and we cannot but conclude that an essential difference in the pathology of the two forms of chronic renal disease exists in respect to their origin and, therefore, in respect to the cardio-vascular changes.

Further, it has been shown by Bamberger, that the cardiac hypertrophy occurs to a marked degree even in the early stages of contracting kidney or interstitial nephritis, before the kidney is much damaged; and this is, therefore, at a period of the disease when some other cause must be acting than the alterations of this organ or of its vessels.

That there should exist one case of hypertrophy of the vascular muscles in chronic Bright's disease with no cardiac hypertrophy, seems to destroy entirely the theory which Johnson has advanced; whereas, according to our belief of the central nervous origin of these hypertrophies, the occurrence of the two forms of hypertrophy is readily disconnected. The observations of Lubimoff furnish us with a direct anatomical basis on which to support this view. He relates many cases in which he examined all the principal ganglia, the cervical, the thoracic, and the solar, and found that the condition of the ganglion cells, the fibres, and the connective tissue differed in each centre respectively, even in patients dying of some general disease. One instance will serve for an illustration of this point; in a body of a patient who died of carcinoma of the pelvic viscera, with an extension of the malady to the general peritoneal surface, some of the ganglia of the solar plexus were diseased, not by an involvement in the new growth, while the superior ganglia showed nearly normal conditions. Similarly, we hold that the renal ganglia may be affected while the cardiac ganglia escape. That both are affected we believe to be the rule in cases of contracted kidney.

But we will not speculate any further in this matter. We had hoped to have furnished convincing reports of the state of the cardiac ganglia and their relation to hypertrophy of the heart. But our preparations thus far have not been fortunate, and we shall merely express our opinion that the cardiac ganglia exhibit changes similar to those described in the renal ganglia. Several other inquiries suggested themselves which we had desired to complete, such as an explanation from the point of view brought forward of the many nervous phenomena of Bright's disease, and of the state of the spinal cord at the origin of the filaments communicating with the ganglia. Yet we felt that we had arrived at results sufficiently distinct not to delay any longer the publication of what we had gained, and to invite others into the field for the benefit of the common cause.

In summing up our work, we think we have arrived at these conclusions:—

1st. That in Bright's disease, especially in the contracting kidney, there exists a constant lesion of the renal plexus.

2d. That whilst this lesion might be looked upon as forming part of a general process of degeneration, in connection with the kidney disease, we think it is the cause of the renal malady and precedes the degenerative changes.

3d. That the diseased condition of the ganglia furnishes the clue to the alterations of the vessels of the kidneys.

4th. That similar changes producing similar results may exist in other ganglia; for instance, in the cardiac plexus, explaining the hypertrophy of the heart.

ARTICLE II.

ON SIMULTANEOUS LIGATION OF THE COMMON CAROTID AND OF THE SUBCLAVIAN IN ITS THIRD PORTION IN THE TREATMENT OF SUPPOSED ANEURISM OF THE ARTERIA INNOMINATA, WITH A CASE.

By LEWIS A. STIMSON, M.D., Surgeon to the Presbyterian and Bellevue Hospitals, New York.

ON the 21st of November, 1865, Mr. Christopher Heath performed for the first time the operation of simultaneous ligation of the common carotid and of the subclavian in its third portion for the cure of innominate aneurism. The idea was not a new one, and operations for the same disease, closely allied or identical in principle and in the means by which the proposed effect was sought to be produced, had been performed during the preceding half century.

The principle of distal ligation in cases which do not admit of the application of a ligature upon an artery between the heart and the aneurism had been orally suggested by Brasdor, professor of surgery in Paris, as early at least as the year 1790, and the suggestion had been repeated in print by his contemporary Desault,[1] but neither surgeon had acted upon it; Brasdor, apparently, not having had the opportunity, and Desault refraining in a case of axillary or subclavian aneurism that came under his care through fear of causing rupture of the sac by the increased pressure which he supposed would be produced within it by the closure of the artery. The first operation upon this principle was performed October 2, 1798, by Deschamps,[2] who tied the femoral artery in the middle of the thigh for the cure of a large aneurism, the upper border of which was less than a finger-breadth below Poupart's ligament. Rupture threatening on the fourth day, another operation was determined upon; the artery was compressed against the pubis, the sac opened, and the vessel tied above and below. The hemorrhage was profuse, and the patient died in eight hours. Brasdor, who died shortly afterwards, was present at this operation, as were also Boyer, Corvisart, and six other consultants.

The second operation was by Sir Astley Cooper, who tied the common femoral below the origin of the epigastric artery for a large aneurism of the external iliac. The patient recovered from the operation, and the aneurism diminished in size, but it continued to pulsate and ruptured soon afterwards.

In 1809 or 1810, Mr. Wardrop saw in consultation a case of supposed aneurism of the innominate and the root of the carotid, and, being familiar with the facts above mentioned, proposed to tie the carotid artery. The proposal was not favourably received by the other consulting surgeons, and the patient was left to his fate, dying within the year. The condition of the vessels disclosed at the autopsy is claimed by Mr. Wardrop, in his book on aneurism published in 1828, to have been curable by the operation he proposed, but as the aneurism proved to be of the ascending aorta and root of the innominate, and not of the innominate and root of the carotid as he had supposed, it seems likely that this claim was the result of his later experience.

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[1] Œuvres chirurgicales, third edition, edited by Bichat, vol. ii. p. 568.

[2] Desault, loc. cit. p. 572.

It is interesting to trace the manner in which the Wardrop method of distal ligature, as we now understand the term, was developed: the method, that is, which proposes to cure an aneurism by slowing the current through it, not by arresting it entirely. Our knowledge of the method recommended by Brasdor is purely traditional, for he left no written account of it. Our conception of it, however, is the application of a ligature on the distal side of an aneurism with no intervening arterial branch between them. Whether or not Brasdor intended to restrict it thus to cases in which the circulation through the aneurism would thereby be completely arrested, is not known. Probably his idea was not very sharply defined in his own mind. It was known at the time that complete arrest of circulation was not necessary to the success of the Hunterian method by ligation on the proximal side, and, as Dr. Sands has well shown in a paper upon "The Distal Operation for the Cure of Aneurism of the Innominata,"[1] intervening branches did exist between the sac and the ligature in the first two operations undertaken in accordance with Brasdor's suggestion; and in the first case in which Wardrop proposed to try it the subclavian was supposed to come off from the aneurism itself or on its distal side, and he nevertheless speaks of it as Brasdor's operation. Writing seventeen years after he had made this proposal, and two years after he had successfully treated an aneurism of the common carotid by distal ligature, and shortly after his successful operation upon Mrs. Denmark (ligation of the subclavian in its third portion for innominate aneurism, the carotid being thought to be occluded), Wardrop claims that his success had established the principle contained in Brasdor's proposal, and explains the previously infrequent recourse to the operation by the fact that surgeons had taken too limited a view of its application, and had deemed the complete stoppage of the circulation a *sine qua non* to its success; adding that cases considered suitable under such a theory must have been extremely few. These are his own words, and it must be evident to any one who will read his book carefully and seek out the meaning of his sometimes obscure and carelessly framed sentences, that by the "new operation" which he recommends he means only a modification of Brasdor's to this extent, that in cases where a complete or almost complete arrest of circulation through an aneurismal sac was not possible he would try the effect of a *moderate* reduction in the rapidity of the current.

There is nothing in this view to detract from the credit due Wardrop.

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[1] Medical Record, February 1, 1869, p. 531.

As we have seen, Brasdor only made the suggestion; Desault, with whom, as is claimed by some, the idea was also original, shrank from putting it into execution; Deschamps and Sir Astley Cooper did the operation unsuccessfully, and these failures were followed by a general discrediting of the principle. Allan Burns, writing in 1812, says of it: "I cannot conceive a more futile idea than to suppose that such an operation could possibly tend to prevent the growth of an aneurismal sac;" and again, "there is no point in the treatment of aneurism which should be more decidedly reprobated than this; it is absurd in theory, and experience proves that it is ruinous in practice." The warmth with which this opinion is expressed may have had its origin in the fact that Burns was employed in the case in which Wardrop first advised the operation and was overruled. It is not surprising that Wardrop took occasion to quote this opinion in connection with the record of his own subsequent successes.

In spite of this hostility and of these reverses, Wardrop accepted and adhered to the principle, and he did this not blindly but with an intelligent appreciation of facts disregarded by others. He had the courage of his opinion, he acted upon it, and he convinced others of its correctness. He established the principle, he was the real introducer of the method, and his is the credit.

Nearly fifty years had elapsed since the suggestion was first made, and at least twenty years since the two attempts to embody it in practice had failed, when Wardrop found his first opportunity. Fifteen years previously he had proposed the operation in consultation, and had been overruled; now the case was his own. The patient was a woman 57 years old, with a carotid aneurism of recent growth. Wardrop tied the artery on the distal side in June, 1825, and cured the disease. Six months later he repeated the operation in another case "in the presence of many practitioners," and again a year later he advised it and was present at its performance.[1] The publication of these cases was followed in 1828[2] by that of the fourth, in which the operation, also for carotid aneurism, was done successfully in September, 1827, by George Bushe.

Wardrop held that the results of these four cases proved the propriety of resorting to distal ligature when no branch intervenes between the ligature and the sac, and when ligation on the cardiac side is impracticable; and he argued, from certain observations made in the course of these cases, that it was often even to be preferred to the Hunterian method when the latter was possible. He then went a step further, and this is what he calls the "new operation," and claimed that aneurism of the innominate might be successfully treated by ligature of one of the branches of that artery. His argument is as follows: Knowing from the observations of Sir Everard Home and later writers that complete arrest of the circulation was not essential to its cure, but that a very considerable reduction of the flow was sufficient, he had believed that the progress of an innominate aneurism might be arrested by simultaneous ligation of the common carotid and of the subclavian in its third portion. But afterwards, having reflected upon the means by which nature obtains a spontaneous cure, and upon the fact that some coagulum is found in every sac at the point where the circulation is least rapid, he had reached the conclusions that a reduction of the rapidity of the current was the first step in spontaneous cure, and that, as this reduction is at first necessarily slight, the process could be accurately imitated, and coagulation started by ligation of a single one of the branches of the artery, even of the third portion of the subclavian. But, as he had noticed in a case of almost complete spontaneous cure that the carotid was occluded, he thought nature should be still further imitated, and the carotid tied rather than the subclavian.

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[1] It is interesting to note that in the second operation he used an animal ligature, silk-worm gut, cut both ends short, and obtained complete union of the wound in three days. The patient died three months afterwards, apparently of kidney disease, and at the autopsy no trace was found of the ligature; the carotid was pervious throughout, and presented a "manifest dilatation a little more than an inch in length near its root, corresponding in position to the pulsating tumour that existed during life."

[2] Lancet, 1827–28, vol. ii.

I shall not stop to point out the objections to this argument; it is sufficient to show that the case which is quoted in its support proves, if anything, the contrary. The case is the well-known one of Mrs. Denmark, aneurism of the innominate with occlusion of the carotid, for which Wardrop tied the subclavian in its third portion. Pulsation returned in the carotid on the ninth day after the operation, but the disease was apparently cured, and remained so for more than a year, the patient dying twenty-six months after the operation in consequence of its return. At the autopsy the sac was found partly consolidated, with a channel of communication between the aorta and carotid, the latter vessel being pervious throughout, and the subclavian to within a quarter of an inch from the ligature, although its lumen was contracted. Wardrop assumes that the carotid carries off half the blood passing through the innominate, and that the branches of the subclavian and its third portion each receive one-fourth. By tying the subclavian, therefore, he diminished the outlet by one-fourth, but by the reopening of the previously occluded carotid it was increased by one-half, and the consolidation, which did not take place while the flow was reduced one-half, was produced during the subsequent increase of the flow, and therefore must have been due to some other cause than reduction of the amount of blood passing through the sac.

It seems evident that the distinction which has become classical among us between "Brasdor's method" and "Wardrop's method," as we understand the terms, was not recognized by Wardrop. According to his view of it, Brasdor's method was simply that of distal ligation, and included those cases in which branches intervened between the ligature and the sac, as well as those in which they did not.

Wardrop's teachings and practice have found many imitators. It is not my purpose to trace further the history of the method, and describe the numerous operations that have been done in accordance with it. That has been done in a most complete and masterly manner by Prof. Sands, in the paper to which I have already referred. I shall restrict my examination, therefore, to cases of simultaneous ligation of the common carotid and the subclavian in its third portion for the cure of supposed aneurisms of the innominata, an operation upon which considerable experience has accumulated since Prof. Sands's paper was published. The following account of an unpublished personal case may serve as an introduction to the subject.

CASE.—Patrick I., an Irish labourer, 34 years old, sought admission to Bellevue Hospital early in January, 1880, to be treated for severe pain in the right shoulder and neck. He was assigned to a medical division, and subsequently transferred to my care in the first surgical, the diagnosis of innominate aneurism having been made by several members of the visiting medical staff. The following notes of the case were taken immediately after his transfer:—

The patient is a spare, medium-sized man, of rather dissipated habits, but with no history or sign of syphilis. Ten months before admission (March, 1879) he first felt sharp pain in his right shoulder, running up to the back of the head, and noticed at the same time a lump in his neck above the right sterno-clavicular articulation. The pain lasted about two months, and the lump, he says, diminished for a time. The pain returned in four months, and has since continued with intermissions, becoming so severe about a month before he entered the hospital that he was compelled to stop work. The lump has lately increased rapidly in size.

On examination there is found a pulsating tumour at the root of the neck, rising an inch and a half above the clavicle, and extending from a point midway between the left sterno-clavicular joint and the median line three inches to the right, apparently displacing the sternal end of the right clavicle forwards. The skin covering the tumour is normal; there is lateral expansive pulsation, and a soft bruit with distinct transmission of the heart sounds. On percussion dulness is found less than an inch below the clavicle, increasing to absolute flatness over the tumour itself. There is no bulging of the ribs. The apex beat of the heart is one and a half inch below and to the inner side of the left nipple; both carotids beat strongly; there is a good radial pulse on the left, but none on the right side; weak pulsation can be felt in the right brachial artery. Pupils equal and dilated. No change in the voice; trachea not displaced to the left. The muscles of the right scapula are notably wasted, and the right arm is smaller than the left; the forearms are of equal size, the patient is right-handed, and has not noticed any weakness in his right arm.

The diagnosis of innominate aneurism, and the proposed method of treatment, were accepted at a consultation of the surgeons, and the operation was performed January 22d, in the presence of my colleagues at the hospital.

Each artery was exposed by a straight incision and tied with carbolized catgut, the carotid above the omo-hyoid, the subclavian outside the scaleni. Both ligatures were passed before either was tied, and no change occurred in the pupils or in the tumour when the knots were drawn. Each ligature was composed of a single strand of catgut, E violin string, No. 70, that had been kept in carbolized oil for two years; the knot was drawn with sufficient force to divide the middle coat of the artery. The operation was done antiseptically, the wounds closed with catgut sutures, a short drainage-tube inserted into each, and the whole covered with carbolized gauze, the upper edge of the dressing being fastened down by a broad overlapping band of adhesive plaster.

Pulsation was felt in the right radial artery just before the operation, and also in the subclavian after it had been exposed.

The constant movements of the patient's head disarranged the dressing, so that the carotid incision, and perhaps the subclavian also, did not remain protected antiseptically, but the patient made a prompt recovery, his temperature not rising after the second day above 99½°. Both wounds united primarily, except at the site of the drainage-tubes, and the subclavian incision was entirely healed by the 15th of February; the carotid wound was reduced by February 1st to a small, slightly oozing surface no larger than a pea, underneath which a firm mass as large as a filbert could be felt, apparently inflammatory induration between the skin and the ligature. By the 16th of February this hardness had disappeared, and the oozing surface had cicatrized.

The immediate effect of the operation was to relieve the pain in the shoulder and neck; it returned after ten days, and then disappeared permanently after the application of a blister. During the fortnight following the operation there was no change in the tumour, then the skin covering it became somewhat reddened, and the patient complained of an occasional sharp darting pain within the lump, and of a feeling as if the clavicle were being pressed forward. There was no accompanying fever, and the symptoms disappeared in a day or two. On February 25th it is noted that the lateral diameter of the tumour was only two and a half instead of three inches, and that it rose to a less height in the neck; the murmur had been barely appreciable for a fortnight, and the expansive impulse distinctly less. During the following fortnight it diminished rapidly in size, and by March 22d its lateral diameter was reduced to an inch, and its height above the clavicle to about three-fourths of an inch. It still pulsated. April 9th the tumour was barely visible, but could be felt as a hard lump behind, and rising half an inch above, the clavicle. Patient felt perfectly well, and insisted upon leaving the hospital.

In Prof. Sands's paper are to be found the details of three cases of this operation; Mr. Holmes, in his lectures upon the surgical treatment of aneurism,[1] collected three more; and to this list I have been able to add eleven, together with two in which the operation was attempted, but abandoned on account of the difficulty of exposing the vessels, and one in which there was an interval of two days between the operations upon the two arteries. The following table contains the seventeen cases first mentioned:—[2]

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[1] Lancet, 1872 to 1875.

[2] The second case given in the list in Agnew's *Surgery* is incorrectly reported there. Cuvellier tied the carotid and the subclavian in its first portion, not in its third; and the disease was known at the time to be a traumatic aneurism of the third portion of the subclavian, not of the innominata. The ligature was knowingly placed on the proximal, not on the distal side. The case is reported in full in Demme's *Militär Chirurgische Studien*, 2d part, page 116.

No.	Operator, and where reported.	Date.	Sex and age.	Result.	Cause of death, and result of autopsy.	Remarks.
1	C. Heath. Lancet, Jan. 5, 1867, and July 2, 1870.	Nov. 21, 1865.	F. 30	Recovered from operation. Died Dec. 8, 1869.	Hemorrhage from sac. Sacculated aneurism springing from right side of ascending aorta, with slight dilatation of the orifice of the innominate. (Path. Soc. Trans., vol. xxi., 1876.)	Pulsation was diminished.
2	Maunder. Lancet, Sept. 28, and Oct. 12, 1867, and Maunder's Surgery of the Arteries, p. 26.	Sept. 18, 1867.	M. 37	Died on 6th day.	Death attributed to obstruction of aorta by recent clot. Small aneurism of the arch of the aorta The sac was full of recent clot, continuous with one filling the arch of the aorta between the heart and the sac.	Operation rendered very difficult by œdema and distension of veins. Patient unconscious and cyanosed for 36 hours before death.
3	Hodges. Boston Med. and Surg. Journal, Aug. 6, 1868.	Apr. 11, 1868.	M. 55	Died on 12th day.	"Apparently exhaustion." No true aneurism. Innominate dilated to about three times its natural size. Much enlargement and atheroma of aorta.	Hemorrhage on 9th day from internal jugular, requiring a ligature.
4	Sands. Med. Record, Feb. 1, 1869.	July 16, 1868.	F. 43	Recovered from operation. Died 14 months afterwards.	Progress of disease. Sacculated aneurism of aorta, pressing back and taking the place of the innominate.	Relief of symptoms; apparent arrest of the disease for several months.
5	Lane. Lancet, Jan. 13, 1872, and July 20, 1872, p. 69.	Sept. 20, 1871.	F. 40	Recovered from operation. Died about three months afterwards.	Rupture of sac externally. No autopsy. Holmes (Lancet, July, 1872) thinks the aneurism was probably of the aorta.	
6	Holmes. Lancet, July 20, 1872.	Nov. 16, 1871.	M. 50	Recovered from operation. Died Jan. 10, 1872.	Progress of disease. Aneurism of innominate, opening by a very large orifice into aorta. Almost filled with coagula, which were very adherent but not regularly laminated.	Catgut ligature. Lister method tried but abandoned because the dressings shifted. Tumor diminished at first, then increased rapidly. Galvano-puncture 2 weeks before death, followed after 2 days by rapid increase, redness, and œdema.
7	Durham. Quoted by Holmes, Lancet, 1872, vol. ii. pp. 37, 69.	....	......	Died on 6th day.	Shock. Very large aneurism of innominate overlapping carotid.	
8	McCarthy. Maunder's Surgery of the Arteries, p. 22.	Oct. 16, 1872.	M. ..	Died on 15th day.	Hemorrhage from proximal side of the subclavian ligature.	
9	Ensor. Lancet, Feb. 6, and July 31, 1875.	Sept. 8, 1874.	M. 50	Died Nov. 12, 1874.	Hemorrhages from sac through carotid wound. Aneurism involved the whole of the innominate; semi-solid contents. Dilatation of the aorta.	The aorta was thought to be involved, and the operation was done to relieve pain. Patient, who was a Hottentot, improved for a month, then grew rapidly worse.
10	Weir. Oral communication.	June 22, 1876.	M. 45	Died on 15th day.	Rupture of aneurism into trachea. Aneurism of anterior wall of innominate, extending up in front of carotid; upper half of sac filled with laminated clot; rupture at lower edge of clot. Dilatation of aorta and of 1st inch of left carotid. Small proximal clot adjoining ligature in each vessel; branches of subclavian pervious and not enlarged.	

No.	Operator, and where reported.	Date.	Sex and age.	Result.	Cause of death, and result of autopsy.	Remarks.
11	Eliot. Am. Journ. Med. Sciences, Apr. 1877, p. 374.	Oct. 15, 1876.	M. 41	Died on 26th day.	Repeated hemorrhages from sac. Large aneurism of anterior wall of innominate. Aortic orifice of the vessel 2 inches in diameter. Sac occupied by laminated clot extending into the subclavian and carotid.	Subclavian ligature came away on 18th day; carotid ligature loose in wound at death. ʒxss solution of persulphate of iron injected into sac on 17th day, after ulceration and first hemorrhage; this was followed by discharge of bloody serum for 3 days, and protrusion of a dry clot which fell out on 24th day, leaving a hole admitting three fingers.
12	King. Lancet, 1878, vol. i. p. 823.	Dec. 9, 1876.	M. 37	Recovered from operation. Died March 30, 1877.	Hemorrhages from a diverticulum of the sac which arose from its lower end and extended up in front of the carotid, communicating with an abscess which opened at the lower end of the carotid cicatrix March 27th. Aneurism occupied entire length of the innominate, and was filled by a firm clot which extended to the ligatures on the two arteries.	Catgut ligatures. Lister dressing. Tumour diminished and grew firm. Patient was fractious and left hospital Feb. 24th, returned Feb. 27th, having been drunk during all the interval, feeling miserably ill, and with redness and distension of the right carotid region which terminated in an abscess.
13	Barwell. Med. Chir. Trans., 1878, vol. lxi. p. 13.	Aug. 14, 1877.	M. 45	Recovered from operation. Died Nov. 24th, in consequence of exposure while intoxicated.	Pneumonia. Aneurism of aorta involving the anterior wall of the innominate and the origins of the right carotid and subclavian. Both arteries firmly plugged. Sac occupied by a firm laminated clot $\frac{1}{3}$ inch thick at thinnest point, with a central globular cavity 1 inch in diameter.	Catgut ligatures. Lister dressing. Tumour was reduced to a small hard lump behind the clavicle and was considered cured Oct. 22d.
14	Barwell. Med. Chir. Trans., 1879, vol. lxii. p 217.	Dec. 6, 1877.	M. 48	Died in 30 hours.	Never recovered from ether, remaining cyanosed and epileptoid until death. No account of autopsy.	The specimen was exhibited, but was not described.
15	Barwell. Med. Chir. Trans., 1879, vol. lxii. p. 217.	Dec. 6, 1877.	F. 37	Cured.	....	Catgut ligatures. Lister method. Tumour diminished, but pulsation persisted in protuberant chest wall. Left hospital Aug. 1878, married Feb. 1879.
16	Barwell. Med. Chir. Trans., 1879, vol. lxii. p. 217.	Jan. 17, 1878.	F. 27	Cured.	....	Catgut ligatures. Lister method. In April pulsation had ceased in tumour and chest wall. Patient was exhibited to the Society Dec. 10, 1878.
17	Stimson. Case herewith reported.	Jan. 22, 1880.	M. 34	Cured (?).	....	Catgut ligatures. Imperfect Lister dressing. 2½ months after operation tumour reduced to a small, hard lump behind the clavicle.

In connection with this list we may consider also with advantage three other cases, which, strictly speaking, do not belong in it. They are those of Broca, Hutchison, and Speir.

In 1862, M. Broca tied the subclavian in its third portion, for the cure of an innominate aneurism, the carotid being and remaining occluded by pressure. Broca speaks cautiously of the result as a *demi-guérison.* The tumour solidified and the patient died of gangrene of the lung, "in no way attributable to the aneurism, which was filled with fibrinous clot, leaving a cavity in the centre of the size of a small fowl's egg, communicating above with the subclavian and carotid, and below with the aorta."

This account was communicated by M. Broca to Mr. Heath, and reported by the latter in the *Lancet*, July 2d, 1870, in connection with his own case.

In 1867, Prof. Hutchison[1] undertook the double operation, the patient being a man 48 years of age. The carotid was exposed through a V-shaped incision and tied near its origin, the intention being to tie the subclavian in its first portion, but as this was found to be impracticable, the vessel was sought outside the scaleni, and the ligature, as was supposed, applied to it there. No pulsation could be felt at the time in it or in the arm. Death was caused by suffocation on the forty-first day, the patient having been more comfortable, and his breathing easier until a few days before his death. At the autopsy an aneurism of the arch of the aorta and innominate was found, involving the orifices of the right carotid and subclavian which were separated about an inch. The sac was nearly filled with laminated clot which extended into the carotid to the site of the ligature, and into the subclavian beyond the origin of the vertebral artery, plugging both vessels. No trace was found of the subclavian ligature, and the continuity of the vessel was uninterrupted. Dr. Hutchison thinks the ligature must have been placed upon the sheath.

In both these cases the result sought by double distal deligation was obtained; that is, circulation through the sac was diminished or arrested —and therefore they may be taken into account in estimating the effect of the operation upon the disease. For the same reason may be added the reports of three autopsies; one, quoted by Prof. Sands, was made in 1843 by Deville and Bérard upon the body of a man who had died of aneurism of the subclavian. The third portion of the artery was occluded, as were also all its branches and both carotids; yet the aneurismal sac was not obliterated. The second is one reported by R. Douglas Powell;[2] a case of aneurism of the innominate in a man of 31, not recognized during life, in which the origin of the subclavian and the entire length of the common carotid were obliterated, while the sac was empty except for a few layers of fibrin at its upper part. Death was caused by rupture of the sac. The third[3] showed occlusion of the innominate and partial occlusion of the left carotid and subclavian in a case of aneurism of the arch of the aorta without production of clot.

In Dr. Speir's[4] case the operations were so nearly simultaneous that it deserves mention in this connection. Dr. Speir occluded the carotid by means of his artery constrictor Aug. 4, 1874, and tied the subclavian two days afterward, in a man 31 years of age, with supposed aneurism of the innominate. The patient died Sept. 7th, in consequence of repeated hemorrhages from the sac, over the apex of which the skin had sloughed. The autopsy showed a pouched aneurism of the summit of the arch of the aorta, the orifice of which was a semi-lunar rent $1\frac{1}{4}$ inches long. The innominate and its branches were healthy. The sac was filled with coagulum projecting through the orifice. The coagulation seems to have been due to inflammation of the sac.

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[1] Med. Record, 1867, p. 265.

[2] Path. Soc. Trans. 1869, vol. xx.

[3] Virchow's Archiv., vol. 73, p. 594.

[4] Arch. Clin. Surg. (N. Y.), Sept. 1876.

Finally, the operation has been attempted and abandoned in two cases, once by Dr. Cheever, of Boston, and once by Mr. Christopher Heath, of London.

Dr. Cheever[1] operated upon a man 38 years of age. Etherization was accomplished with much difficulty, on account of dyspnœa produced by the recumbent position, and anæsthesia was not obtained until after the lapse of twenty minutes and the use of eight ounces of ether. The patient then being livid, the ether was withdrawn and the operation begun. An attempt to tie the carotid having failed in consequence of profuse venous bleeding which made it impossible to find the vessel, the subclavian was next sought. This artery could not be seen, but it was felt and held under the finger while the needle was passed; as the point of the instrument emerged from beneath the vessel a smart gush of venous blood filled the wound, causing the patient to gasp and the pulse to disappear. In the effort to secure the subclavian vein, which was supposed to have been wounded, the incision was enlarged and the central portion of the clavicle removed, but the patient appearing to be moribund, his face blue, and his blood the colour of prune juice, the operation was abandoned. The patient died two hours afterwards. The aneurism was of the innominate, as large as an orange, and coated with a layer of firm fibrin. The vertebral artery was plugged.

In Mr. Heath's case[2] the patient was a man 45 years of age. He began the operation with the subclavian, encountering much bleeding and great difficulty in the search. At last he came upon a pulsating sac which appeared to be the aneurism extending further than was anticipated. So, considering the application of a ligature impossible, he plugged the wound with lint and tincture of iron. Bleeding recurred at intervals, and the patient died on the 6th day.

The autopsy showed a sacculated aneurism springing from the arch of the aorta in front of the innominate. The sac reached into the outer triangle of the neck, where it was seen during the operation, and where it ultimately gave way.

Of these twenty-two cases we may almost say what Mr. Holmes has said of the Hunterian operation upon the innominate and first portion of the subclavian, that they are a ghastly record of death and blood; but they present a measure of success, one that is not inferior to that of any other known method of treatment of this most formidable disease. There is, however, less to be gained by treating them as statistics and establishing percentages of success and failure, than by seeking what light they may throw upon the method and possibilities of cure.

The possibility of the cure, of the obliteration of the cavity, of an aneurism by complete distal occlusion has been demonstrated by operation and by spontaneous cure following impaction of a clot. Mr. Holmes claimed in 1872 that the same possibility existed in innominate aneurism, and he presented facts to "afford definite proof of the curative power of distal obliteration of the arteries in innominate aneurism." Of the six facts which he presents only two have any claim to be considered proofs, and even they are not beyond reproach, because, although in each case the sac was filled with firm coagulum, there was still a small channel through which blood passed to the subclavian. One of these was a case of spontaneous cure by impaction; the other was the case in which Wright, of Montreal, tied the carotid. In the third case the left carotid was tied for aneurism of that vessel extending into the aorta; the upper portion of the sac became filled with clot, but rupture took place below into the lung. In each of the remaining three cases the subclavian was found occluded after death, and Mr. Holmes thinks that if the carotid had been tied a cure would have been effected. The list of such cases might be materially increased, but they are not "proofs." On the other hand, the specimens of Deville and Bérard, and of Mr. Powell, above referred to, show that total distal occlusion does not always produce consolidation.

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[1] Boston Med. and Surg. Journal, May 6, 1869.

[2] Path. Soc. Trans., vol. xxii. p. 95.

So far as I know there are but two specimens that prove the possibility of such a cure. They are the ones furnished by Cases XII. and XIII. of this table, and even in one of these the permanency of the cure was destroyed by the formation of a second aneurism at the proximal border of the first. In addition we have Broca's case, a "half-cure" prevented perhaps from becoming a complete one by a fatal intercurrent disease, and, if clinical evidence may be accepted, Barwell's last two cases. (Cases XV. and XVI.)

The same specimens and cases show the possibility of a cure by a distal occlusion which is not complete, but only partial. They are all cases of occlusion of the carotid and of the subclavian in its third portion, and all, with the exception of Broca's, cases of double simultaneous ligation. There is also another case[1] which bears upon this point, although the aneurism was of the first part of the subclavian, not of the innominate.

The patient was a man forty-six years of age who fell while carrying a heavy load upon his right shoulder. The next morning he noticed a marked change in his voice, and soon afterwards a pulsating tumour appeared just above the right side of the sternum. Severe pain in the shoulder and neck caused him to seek admission to St. Luke's Hospital nine months after the fall. A pulsating tumour giving no murmur was found above the inner end of the right clavicle, measuring one and a half inches in lateral diameter, and extending one inch up the neck. Voice husky; right vocal cord paralyzed. The diagnosis of aneurism of the first portion of the subclavian was made, and Dr. J. L. Little tied the carotid and the subclavian in its third portion May 4, 1877. The tumour presented but little if any change during the following three months, and then diminished perceptibly during the fourth month after an attack of left hemiplegia and aphasia, which occurred July 23. The patient recovered partially from the paralysis, the left arm remaining somewhat rigid, and a year after the operation the tumour had almost entirely disappeared. He is still living, and there has been no recurrence of the disease.

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[1] Arch. Clin. Surg. (N. Y.), Oct. 15, 1878, p. 13.

It is especially worthy of remark that the two specimens (Cases XII. and XIII.) show that the partial arrest had become complete by the plugging of the entire length of the subclavian, and it seems not unlikely that the cure was effected first by the production of a clot in the sac in consequence of the slowing of the current, and secondly by the growth and extension of the clot into the subclavian. In no case, at least, do we find such plugging of the subclavian when the sac is not filled with clot, or when the aneurism has proved to be of the aorta; such cases present no exception to the rule that a clot does not extend backward beyond the branch nearest the ligature.

These two specimens and the other successful cases, including Dr. Little's, weaken the force of the objection often made to ligature of the subclavian in its third portion, that communication between the branches of that vessel and the sac is sufficient to defeat the object of the ligature.[1] They show that a cure can be accomplished notwithstanding it, but, on the other hand, it must be remembered that there are other cases to show that this complete occlusion does not necessarily follow, even after partial consolidation of the sac; just as obliteration of the sac may fail after complete distal occlusion.[2]

It is evident that factors other than mere arrest or retardation of the current are concerned in the production of a cure. One of these is the varying coagulability of the blood, and another may perhaps appear on examination of the conditions disclosed by the autopsies quoted above.

It is very well known that the tendency of blood to coagulate within the vessels varies under conditions, the influence of which is not entirely understood. It might be sufficient to refer in illustration of this fact to the spontaneous coagulation which takes place in some pouched sacs, and to the uninterrupted progress of the disease and entire absence of coagulation in others, or to the benefit sometimes obtained by absolute rest in the recumbent position; but there are other illustrations much more striking. The simple introduction of a hypodermic needle into a femoral aneurism and its retention there for an hour or two was sufficient in one case to start a consolidation that became complete, and in another case the similar introduction of six needles and their retention for four days produced the same result; while in a personal case the introduction of a loose bundle of horsehair, consisting of about fifteen pieces each six inches long, into an ilio-femoral aneurism, produced not the slightest change in the physical symptoms of the tumour during the month that elapsed before I finally tied the external iliac and cured the disease. Even the clot formed in a vessel on the proximal side of a ligature varies greatly in size, or may be entirely absent. After ligature of the carotid near its bifurcation the clot is frequently found to extend from the ligature to the origin of the artery, but in Case VI. there was practically no clot at all in either vessel. Such varying results, due to unknown and uncontrollable causes, might determine the success or failure of an operation.

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[1] Prof. Sands says: "It is not difficult to explain the failure of the various operations detailed. In all of them the branches of the subclavian . . . are left open, and the current of blood passes into them through the aneurism with sufficient force to prevent the deposition of laminated fibrin. . . . In no case does the cavity of the aneurism seem to have been obliterated." And Mr. Holmes says: "The ligature of the third part of the subclavian necessitates the continuance of circulation through the sac; and if so, the absolute obliteration of the tumour, its radical cure in the strictest sense of the term, making relapse impossible, cannot be obtained by this means."

[2] I have met also with one case of so-called spontaneous cure of an aneurism of the innominate, the vessels remaining pervious. It is reported in the *Path. Soc. Trans.*, 1873, vol. xxiv. p. 39, as a "solidified aneurism of the arch of the aorta and the innominata as large as a large lemon, with a direct channel of communication through it to the subclavian and probably also to the carotid. The coagulum was uniform in colour and texture, organized and laminated, and in no part was it soft or looking as though it was degenerating or breaking down."

Another element, important, I think, in determining the result, is the character and especially the size of the communication between the aneurism and the aorta. The twenty-two cases contained in this paper furnish eight autopsies bearing upon this point, Cases VI., IX., X., XI., XII., XIII., Broca's, and Hutchison's. In three of these (XII., XIII., and Broca's), the sac was filled with a firm coagulum entirely in one case, and with the exception of a central globular cavity in the two others. In two of these three the proximal orifice of the innominate was apparently of normal size; in the remaining one it was involved in the dilatation which included the adjoining portion of the aorta. In Case X. the orifice of the innominate was somewhat enlarged; as death was caused by rupture of the sac a fortnight after the operation, it was impossible to say what the ultimate effect might have been had life been prolonged. The specimen, which is preserved in the Roosevelt Hospital Museum, is suggestive of a possible cure.

In Cases VI., IX., XI., and Dr. Hutchison's, the orifice was very large, and in two of them formed part of a general dilatation of the arch of the aorta. They all contained some clot, but in all death was caused by the progress of the disease after the lapse of a period of time sufficiently long to have given the treatment a reasonable opportunity to effect a cure if it was possible.

The most, perhaps, that can be claimed for these facts, limited as they are in number, and incomplete in detail, is, that they do not conflict with the general impression that a narrow orifice favors consolidation. But when the aneurismal expansion includes not only the proximal orifice of the innominate but also the adjoining portion of the aorta, there is but little hope of obtaining a permanent cure by the operation. Laminated fibrin may indeed be deposited in the upper portion of the sac, and the advance of the disease may be arrested at that point, but the weakened wall of the aorta is not relieved from the strain, and the disease may progress there unchecked. The relief afforded, and the arrest of growth obtained recently in cases of aortic aneurism by ligature of the left carotid, may indeed inspire a hope of similar gain in cases such as we are considering, and this possibility must be taken into account in weighing the chances of an operation, but the gain, great as it may be, is far from being a cure of the disease.

I do not know if there are any preparations in existence showing the condition of the aneurismal wall and the nature of its connection with the inclosed fibrin after complete consolidation and cure. Pathologists have described the mode in which an aneurism enlarges, but are silent concerning the details of its contraction. We know that the tumour continues to diminish long after all pulsation has ceased in it, and that this reduction may be so extreme as to leave nothing but a barely recognizable nodule. Such a change is not compatible with the presence in the sac of the fibrin originally deposited there; it must disappear to make contraction possible. This disappearance is possible only through regressive changes in the fibrin, by its liquefaction and escape into the adjoining artery, or its absorption by invading tissue. Organization of a clot, in the sense of its direct transformation into living tissue by the ulterior development of the cellular elements of the blood deposited in it simultaneously with, or subsequently to, its coagulation, is an untenable, I may say an exploded, theory. Microscopical examination of a thrombus shows two sets of changes, one in the clot, the other in the vessel-wall. The fibrin softens, the vessel-wall proliferates, and the granulations springing from the latter penetrate into the clot or spread over its surface. It is to this growth that the attachment of the clot to the vessel is in great part due, for the granulations send out long interlacing processes into the interior of the clot, which bind the two surfaces together.

If now we apply to the aneurism the knowledge gained by a study of the thrombus, we have a possible explanation not only of its contraction, but also of the danger of a large proximal orifice. In a half-consolidated aneurism we find a clot that is closely adherent at the point were it presumably began to form, and loose at others, especially at its edge, where the clot has either grown rapidly or has been kept apart from the wall by an interposed layer of blood, so that the granulations have not had time to form or an opportunity to penetrate it. The blood, entering with full force through the large orifice, makes its way between the clot and the wall, and exerts upon the latter the same pressure that it would exert were no clot present, and thus the main condition necessary to the expansion of the sac, direct pressure of the blood upon it, is maintained. The very enlargement of the orifice of the innominate is in itself an evidence of weakness at that point, and adds force to an objection raised by Prof. Sands against the distal ligature, an objection based upon the usually unhealthy condition of the vessel-wall on the cardiac side of an aneurism. Case XII. furnishes corroborative evidence.

Both these conditions, the degree of coagulability of the blood and the size of the orifice, so potent in their influence upon the results of the treatment, are beyond our power to recognize beforehand, and they add another to the uncertainties of the diagnosis, already so great.

The term "supposed aneurism of the innominate," so frequently employed in the discussion of this subject, and in the record of cases, is a recognition only too well justified of the difficulties attending the diagnosis. The cases mentioned in this paper, together with three others[1] encountered incidentally in the search, in which some method of treatment other than the one now under consideration was adopted, furnish nineteen autopsies. In seven of these the aneurism was found to be purely aortic, in four it involved both the aorta and the innominate, in two there was dilatation of the aorta or of the aorta and innominate, but no true aneurism, and in only six was the innominate alone involved. When it is remembered that most if not all of these were hospital cases, and that the aid of others in the diagnosis was sought by the surgeon in charge, notably in some of the cases where the error was greatest, it is evident that the mistakes were the result not of ignorance or lack of care, but of the insufficiency of the diagnostic means at our disposal. And when it is further noticed that an aneurism of the aorta may extend up into the neck, overlapping and taking the place of the innominate, and even pass out between the scaleni, we are at a loss to understand how a correct and positive diagnosis can be made.

Such being the facts, what opinion should be held concerning the advisability of the operation? The answer to that question requires consideration not only of the percentage of success, but also of the possible amelioration of symptoms, of the value of alternative measures, and of the risk inherent in the operation itself. Two, three, or even four successes in a total of twenty-two cases is not a proportion to give much encouragement, but can a better one be secured by other means? The only other operations that can be proposed are the ligature of only one artery instead of both, or the application of the ligature to the subclavian in its first instead of in its third portion. Of the first, Prof. Sands records nineteen cases with only one recovery, and on theoretical grounds there is every reason to maintain that if anything can be gained by tying one vessel, more will be gained by tying two, and the risks of the operation are not materially increased thereby. The second (ligature of the carotid and of the subclavian in its first portion) has been done twice, the cases terminating fatally in six and fourteen days respectively. It is probable that with the aid of antiseptics a catgut ligature could be placed upon the first portion of the subclavian without much danger of secondary hemorrhage, but the presence of an aneurism would almost inevitably make it impossible to expose the vessel.

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[1] Two of these are included because the subclavian and carotid were tied, and the third, because it is contained in previous tables, although in it the carotid alone was tied. The cases are: (I.) One in which Hobart tied the carotid and first part of the subclavian in 1839. The patient died of secondary hemorrhage from the carotid ligature. The autopsy showed a pyriform aneurism of the aorta overlapping the innominate. The case is quoted by Mr. Holmes in the *Lancet*, July, 1872. (II.) One in which Mr. Knowles tied the right common carotid "for supposed aneurism of the lower portion of its trunk involving perhaps the innominate." The patient died three months afterwards of apoplexy, and the autopsy showed an aneurism of the aorta. (*Lancet*, 1868, vol. i. p. 750.) (III.) An unpublished case in this city. The common carotid was tied, and two or three years afterwards the subclavian, in its third portion, for supposed aneurism of the innominate. The patient survived the last operation about three years, dying in Bellevue Hospital in 1879 of phthisis. The specimen is preserved in the museum, but has been prepared by plaster injection to show only the collateral circulation. As well as can be made out in its present condition, there is no aneurism of the innominate, and only a uniform dilatation of the first six or eight inches of the aorta. The branches of the subclavian are pervious, and the supra-scapular is considerably enlarged.

Compression by means of temporary ligatures, silver wire, or specially devised instruments may be passed by without remark, since the principle is the same as that of distal ligation, and the risks of the operation little, if at all, less. Galvano-puncture is more dangerous than ligation, and the temporary introduction of needles has yet to be tested.

The only remaining alternative is the treatment by rest and restricted diet. All recent authors recommend in a rather perfunctory manner that this should be tried before resort is had to operative procedures; and in many of the above-mentioned cases it is recorded that this advice was followed without any apparent good result. The method is one that requires much fortitude and self-control on the part of the patient, while most of the cases come from a class who are but little accustomed to exercise any restraint upon their appetites, their passions, or their feelings. Even when aided by the moral effect of an operation and the physical weakness following it, it is often difficult to restrain them. In Hobart's case secondary hemorrhage was brought on by the patient springing from her bed in a fit of temper and throwing a pillow at the nurse. In cases V., XII., and XIII. death was hastened, if not directly caused, by the refusal of the patients to remain in hospital, and by their indulgence in liquor, notwithstanding their knowledge of the danger incurred by this conduct. In my own case the patient was a sullen, vindictive man, intolerant of pain, and impatient of control. The slightest or most quickly remedied neglect would excite in him a feeling of anger that would manifest itself for days whenever the offender came near him. An attempt to restrict his diet before the operation almost led to his leaving the hospital, and it was not until after the improvement in his condition had become manifest to himself that he was willing to remain quietly in bed. What could be expected in such cases from the treatment by rest and diet?

Although the operation has effected a cure in only two cases, XV. and XVI., or in four including cases XIII. and XVII., it has often been followed by a more or less marked amelioration of the distressing symptoms, a result which is a legitimate object of treatment when a radical cure is not possible, and when the means of obtaining it are not in themselves too dangerous. On the other hand, the operation hastened or caused death in five of the seventeen completed cases, and in both those in which the operation was abandoned after it had been begun; once, Case VIII., by hemorrhage on the fifteenth day from the seat of the subclavian ligature; twice (Case III. and Dr. Cheever's) by hemorrhage from the internal jugular or subclavian vein wounded during the operation; once, Case VII., by shock; once, Case II., on the sixth day by an unknown cause, possibly the progress of the disease, as the patient's condition was apparently desperate at the time of the operation; once, Mr. Heath's second case, by hemorrhage from the sac, which was exposed and weakened during the unsuccessful attempt to apply the ligature; and once, Case XIV., in thirty hours, by the persistence of an epileptoid condition attributed to the ether.

These facts speak for themselves, and the surgeon who refers to them will be guided by the values which he attaches to them, and the inferences he draws from them. The following conclusions are offered as a summary of a few of the points:—

I. A positive diagnosis of the origin and extent of an aneurism which has appeared behind the right sterno-clavicular articulation, and extended thence into the neck, is often impossible.

II. Simultaneous ligation of the carotid and of the subclavian in its third portion in cases of aneurism of the innominate, has been followed by complete obliteration of the cavity of the sac and of the entire length of the subclavian on the proximal side of the ligature; and in other cases, where the branches of the subclavian have remained pervious, consolidation has been so extensive as to leave only a small central channel, and the progress of the disease has been indefinitely arrested.

III. Therefore, the impossibility of safely placing a ligature upon the first portion of the subclavian is not a weighty argument against the treatment of innominate aneurism by distal deligation.

IV. Cases IV. and XIII., and the successes obtained by Mr. Holmes and Mr. Heath in the treatment of aortic aneurism by ligation of the left common carotid, diminish the objections arising out of the difficulty of making a diagnosis.

V. The operation deserves a position among surgical procedures of recognized gravity, but admitted propriety.

VI. Consolidation follows so slowly after the operation that the latter can do no good when the sac is inflamed or rupture is threatening.

VII. If the operation is undertaken when the aneurism is large and the breathing obstructed, no anæsthetic should be used.

Note.—*May* 20. Patient presented himself for examination. He was under the influence of liquor, and confessed to steady drinking since he left the hospital a month ago. The pulsating tumour, somewhat reduced in size since the last examination, could still be readily felt behind the clavicle. He complained of nothing except that his right hand was cold in the morning.

Article III.

Is the Action of the Medulla Oblongata in Normal Respiration Reflex?

By Austin Flint, Jr., M.D., Professor of Physiology and Physiological Anatomy in the Bellevue Hospital Medical College, New York, etc.

In connection with a series of experiments published in 1877, the question occurred to my mind whether or not the action of the medulla oblongata in normal respiration could strictly be classed among those operations recognized by physiologists as reflex. That the medulla oblongata is the centre presiding over certain reflex phenomena, acting through some special nerves, there can be no doubt. This centre seems to serve as a coordinator of the muscles of expression, and it has certain reflex functions connected with the respiratory muscles, such as coughing, sneezing, etc. In certain instances, also, in which respiration is temporarily suspended, a stimulation of parts of the general surface, as by a dash of cold water, will excite respiratory movements. Such an action as the one last mentioned might properly be called reflex; but the phenomena which I here propose to consider are those of ordinary, normal respiration and the exaggerations of the respiratory sense which amount to a more or less intense feeling of want of air.

The general view under which physiologists have been accustomed to regard the respiratory movements as reflex is the following: It has been thought that there existed in some part of the organism or in the system at large a certain sense, which may be called the sense of want of air, the respiratory sense, or the *besoin de respirer* of the French, dependent upon either an actual or an impending deficiency of oxygen or upon an impression produced by the circulation of blood containing carbonic acid in parts that should normally receive oxygenated blood. This "respiratory sense" has been taken as the starting-point of the respiratory acts. Regarding a reflex phenomenon as involving an impression conveyed by afferent nerves to a nerve-centre, which impression, by the action of the nerve-centre, is converted into a stimulus and is reflected along certain efferent nerves to muscles, the conditions of the operation of reflex action in ordinary respiration have been regarded as complete. The respiratory sense, according to this view, is conveyed by certain centripetal nerves to the medulla oblongata, and here it is converted into a stimulus which is conveyed by the proper centrifugal nerves to the respiratory muscles, and there follows an act of inspiration.

My principal object, in this article, is to discuss the question of the so-called reflex action of the medulla oblongata in respiration, drawing my conclusions mainly from my own experiments. I shall not, therefore, attempt to give a full account of the literature bearing upon the action of the medulla oblongata as the respiratory nervous centre, or even of the experiments which relate to its reflex function, except in so far as the latter have been followed by important advances or changes in the views of physiologists or as their history involves questions of priority.

In 1809, Legallois made a number of experiments upon rabbits, in which he showed that respiration ceased suddenly when a section of the medulla oblongata was made to include the origin of the eighth pair of nerves; but that the respiratory acts continued when the cerebrum, cerebellum, and a part of the medulla oblongata were removed by successive slices from before backward.[1] Flourens extended the observations of Legallois, and fixed the limits of the respiratory nerve-centre in the rabbit between the upper border of the origin of the pneumogastric nerves and a line drawn about a quarter of an inch below the lowest point of origin of these nerves.[2] Longet and Flourens, in later observations, restricted the limit still farther, and showed that it was confined to the gray matter of the lateral tracts, or the intermediary fasciculi.[3] Since the publication of the experiments of Flourens, nearly all physiologists have agreed that the respiratory nervous centre is situated in some part of the gray matter of the medulla, and this view I accept without reserve. Its most notable opponent, however, is Dr. Brown-Séquard. This author contends that the arrest of respiratory movements which follows destruction of the medulla is due to irritation of surrounding parts, and not to the destruction of the so-called respiratory centre; and that, in certain cases, the movements may become reëstablished after the irritation has subsided.[4] In the absence of their full confirmation by other observers, I do not regard the experiments or the conclusions of Dr. Brown-Séquard as satisfactory; and I still hold that the medulla oblongata is the centre presiding over the respiratory acts.

Marshall Hall, in his memoir on the "Reflex Function of the Medulla Oblongata and Medulla Spinalis," published in 1833, says nothing with regard to the reflex character of respiration. In the Croonian Lectures, delivered before the Royal College of Physicians in 1850, he advances the view that the normal respiratory acts are reflex and dependent upon excitation of the pneumogastric nerves by the accumulation of carbonic acid evolved in the lungs by the venous blood.[5] Subsequent observations, however, have shown that the theory proposed by Marshall Hall is incorrect; and, at the present day, it is not adopted by any physiologist of recognized authority. As early as 1839, John Reid suggested that the sense of want of air was due in a measure to the circulation of venous blood in the medulla oblongata.[1] This fact is interesting in view of the results of recent experiments which will be detailed farther on. In 1841, Volkmann made a number of experiments, the conclusion drawn from which was that the sense of want of air depends upon a certain condition of the general system as well as an impression made upon the pulmonary mucous membrane.

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[1] Legallois, Expériences sur le principe de la vie. Œuvres, Paris, 1824, tome i. p. 64. The date of these experiments is given by Legallois on page 71 of the above-mentioned work.

[2] Flourens, Système nerveux, Paris, 1842, p. 204.

[3] Longet, Traité de physiologie, Paris, 1869, tome iii. pp. 387, 388.

[4] Brown-Séquard, Recherches sur les causes de mort après l'ablation de la partie de la moelle allongée qui a été nommée point vital. Journal de la physiologie, Paris, 1858, tome i. p. 217 et seq.; and Recherches expérimentale sur la physiologie de la moelle allongée. Ibid., 1860, tome iii. p. 151 et seq.

[5] Marshall Hall, Synopsis of the Diastaltic Nervous System, London (no date), p. 43.

> "The respiratory movements appear really to be of a reflex character in the following way: The exciting agent is carbonic acid—not that which has become free in the air-passages, but that which is contained in the blood; the situation of the stimulation is in every part of the body, not alone the pulmonary mucous membrane; finally, the nerves brought into action are all nerves which conduct centripetally operating toward the medulla oblongata, not exclusively the vagus."[2]

Volkmann states, immediately following the passage just quoted, that the respiratory movements find their impulse in a "respiratory necessity," and that this originates in the entire system; that all animals require oxygen from the blood in place of the carbonic acid which they give up to the blood; and that, as soon as the blood is overcharged with carbonic acid, this "necessity" (respiratory) cannot be satisfied.

In 1861 I made a series of experiments with the view of ascertaining the situation of the respiratory sense, adopting the view, which was then almost universally received, that the respiratory acts are reflex.[3] The main points in these experiments were the following:—

When the chest was opened in a living dog, and a bellows fixed in the trachea, so long as artificial respiration was efficiently performed, the animal made no respiratory efforts. In these experiments the animals were usually etherized; but in several instances they were allowed to come from under the influence of the anæsthetic. The diaphragm and other important respiratory muscles were denuded and fully exposed to view. This was almost an exact repetition of an experiment performed by Robert Hook in 1664.

An artery was then opened and the blood was allowed to flow in a small stream. When the artificial respiration was suspended, the animal began to make respiratory efforts as soon as the blood became dark in the

[1] Reid, An Experimental Investigation into the Functions of the Eighth Pair of Nerves, etc., Part Second. Anatomical and Physiological Researches, Edinburgh, 1848, p. 285; and Edinburgh Medical and Surgical Journal, April, 1839.

[2] Volkmann, Ueber die Bewegungen des Athems und Schluckens, etc. Archiv für Anatomie, Physiologie, und wissenschaftliche Medecin, Berlin, 1841, S. 342.

[3] Flint, Jr., Experimental Researches on Points connected with the Action of the Heart and with Respiration. American Journal of the Medical Sciences, Philada., October, 1861, p. 372 et seq.

arteries; but, when artificial respiration was resumed, as soon as the blood became again bright red in the arteries, the respiratory efforts ceased.

In order to ascertain whether the sense of want of air were due to a deficiency of oxygen or to the presence of carbonic acid in the blood of the arteries, I drained the animals of blood, sometimes from a large artery and sometimes by excising the heart, at the same time keeping up artificial respiration carefully and efficiently. As the system became drained of blood, there always occurred vigorous and even violent respiratory efforts, although the lungs were kept supplied with pure air.

From these experiments I reasoned that, the respiratory movements being, as I thought, reflex, the sense of want of air depended upon a deficiency of oxygen in the system at large, and not upon the presence of carbonic acid in the blood of the arteries, for the sense seemed to be felt by the animals in my experiments when the system was drained of blood, the arteries containing no blood charged with carbonic acid.

In 1868, about seven years after the publication of my experiments in the *American Journal of the Medical Sciences*, Pflüger published a very interesting article upon the same subject.[1] In this article, a very elaborate review is given of the literature of the subject. He first refers to the opinions of various authors with regard to the question of a difference in colour between the blood of the umbilical arteries and the umbilical vein, and then goes on to state that " it is established without doubt that, after birth, there is a diminution in the quantity of oxygen in the body of the newly born, which, as the following researches will show, is the real cause of respiration." The experiments by means of which Pflüger came to the conclusion that the sense of want of air, dyspnœa, and apnœa were due to a want of oxygen in the system, consisted mainly in causing animals to breathe an irrespirable gas, such as pure nitrogen.[2]

"Using blood-letting for ascertaining the condition of the blood during dyspnœa, I arrived at the following facts: As soon as the dog begins to breathe pure nitrogen, it is scarcely fifteen seconds before he makes violent and deep inspirations; at the end of thirty seconds, the most intense dyspnœa is observed, the blood is already almost absolutely black, which must be due to the enormously rapid tissue-metamorphosis of the animal. At the end of one minute the animal is already almost asphyxiated. The respiratory movements are very infrequent or have ceased, but the heart still beats."[1]

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[1] Pflüger, Ueber die Ursache der Athembewegungen, sowie der Dyspnoë und Apnoë. Archiv für die gesammte Physiologie, Berne, 1868, Bd. i., S. 61 et seq.

[2] Rosenthal, in his work on the "Respiratory Movements," published in 1862, anticipated the experiments of Pflüger upon the influence of the insufflation of irrespirable gases upon the respiratory movements. He noted that the manifestations of dyspnœa ceased in animals when the chest had been opened and oxygen was passed through the lungs, but that they continued when, instead of oxygen, nitrogen or hydrogen was used, "although in this case the carbonic acid, as well as the oxygen, was removed from the blood." From this it appears to follow that it is not the increased quantity of carbonic acid, but the diminished quantity of oxygen which, in dyspnœa, produces the mediate or the immediate stimulation of the respiratory central organ. (Rosenthal, Die Athembewegungen, etc., Berlin, 1862, S. 4.) My own experiments were published in 1861.

Then follows a series of examinations of the blood under normal conditions at various times after causing an animal to breathe pure nitrogen. In one of these observations, after causing a dog to breathe nitrogen for one minute, the oxygen of the blood was found to be reduced from 14.35 per cent. to 0.2 per cent., and the carbonic acid from 36.9 per cent. to 29.9 per cent., showing a great diminution in oxygen and a considerable diminution in carbonic acid. "No one, therefore, can be of the opinion that dyspnœa and asphyxia in breathing indifferent gases is connected with the accumulation of carbonic acid."[2]

While Pflüger assumed to give a review of the literature of the subject under investigation, he made no mention of my experiments published in 1861, although the results were nearly identical with his own. Later observations and experiments, however, have convinced me that the interpretations of my earlier experiments, as well as of those made by Pflüger, were incorrect. I do not now believe that the acts of respiration are purely reflex in the sense in which this term is generally used; and I do not believe that the sense of want of air is due to a deficiency of oxygen in the system at large. I have become convinced, by experiments made in 1877, that the real cause of the sense of want of air, with its various exaggerations and modifications, is a deficiency in, or an absence of oxygenated blood in the vessels of the medulla oblongata. This opinion has been entertained by certain physiologists on theoretical grounds, but, so far as I know, it had not been sustained by direct experiment prior to 1877.

In 1877, I made a series of experiments which seemed to me to demonstrate conclusively that the sense of want of air is due to a deficiency of oxygen-carrying blood in the medulla oblongata. The details of these experiments have already been published,[3] and I shall here give merely a summary of the results.

If the chest of a dog be opened, the animal being under the influence of ether, and if artificial respiration be efficiently maintained by means of a bellows fixed in the trachea, the animal will make no respiratory efforts so long as fresh air in sufficient quantity is supplied to the lungs. This is an old experiment, dating from the time of Robert Hook, in 1664, and has been repeatedly verified.

If, air still being supplied in adequate quantity to the lungs, the aorta be tied or the system be drained of blood, the animal will make violent respiratory efforts under the influence of the sense of want of air. This is due to the fact that the oxygen cannot get to the system or to some part or parts of the system, and this demonstration was made and published by me as early as 1861. Similar results were obtained by Rosenthal, in 1862, and by Pflüger in 1868.

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[1] Pflüger, op. cit., S. 89.

[2] Pflüger, op. cit., S. 95.

[3] Flint, Jr., Experiments on the Effects upon Respiration of cutting off the Supply of Blood from the Brain and the Medulla Oblongata. New York Medical Journal, November, 1877, vol. xxvi. p. 449.

In 1877, it occurred to my mind that it was possible to ascertain by experiment whether the sense of want of air were due to a want of oxygen in the general system or in some restricted part. It being so well established that the medulla oblongata is the respiratory nervous centre, I was naturally led to look for some means of cutting off the supply of blood from this part. This can be easily done by tying the innominate artery and the left subclavian artery in a dog, in this animal the aorta giving off from the arch these two vessels which are the only sources of supply of blood to the head and the anterior extremities. The following experiment, which I copy from my article published in 1877, shows the effect of constricting the vessels given off from the arch of the aorta. This experiment is a type of many others made in my laboratory and in public demonstrations.

September 30, 1877.—A medium-sized, full-grown dog was brought completely under the influence of ether. The trachea was then opened and connected with a bellows, and artificial respiration was maintained. Over the valve of the bellows was placed a sponge, which was saturated with ether from time to time, so that the animal was kept completely anæsthetized during the experiment. The air in the bellows was also changed from time to time by pushing up the valve with the fingers and forcing out the vitiated air. The chest and abdomen were then laid open by a continuous incision in the median line, and the ribs were bent backward and secured with a strong cord tied behind the back, so that the lungs and heart were fully exposed. The pericardium was then cut away, the great vessels near the heart were isolated, and loose ligatures were thrown around the trunk of the innominate artery, the left subclavian artery, the descending vena cava, the descending portion of the aorta, and the ascending vena cava.[1] In this way, I was prepared to constrict the several vessels at will.

When these preliminary steps had been completed, the animal being entirely under the influence of ether and artificial respiration being kept up efficiently, there were absolutely no respiratory efforts, and the diaphragm, which was exposed, was quiescent.

The artificial respiration was then arrested. In forty-five seconds, the animal began to make violent respiratory efforts. Artificial respiration was then resumed, and the respiratory efforts of the animal ceased. When the artificial respiration was arrested, we first noticed a movement of the corners of the mouth at regular intervals, and then the mouth was widely opened and the diaphragm became strongly contracted, also at regular intervals. The time was taken at the first violent respiratory effort.

The animal being perfectly quiet and making no efforts at respiration, the innominate artery, the left subclavian artery, and the descending vena cava, were tied nearly simultaneously, artificial respiration being constantly and efficiently maintained. In two minutes and eight seconds, the animal began to make respiratory efforts, which continued so long as the vessels remained constricted.

The ligatures surrounding the vessels mentioned above were loosened five minutes and twenty-two seconds after they had been tied, and the respiratory efforts of the animal instantly ceased. After three minutes, artificial respiration was stopped, and the animal began to make respiratory efforts in thirty-nine and a half seconds, which ceased as soon as artificial respiration was resumed.

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[1] In the dog, the aorta gives off the innominate artery, "which gives off first the left carotid, and then divides into the right subclavian and right carotid" (Foster, "Elementary Practical Physiology," London, 1876, p. 13). The left subclavian artery arises directly from the aorta.

The descending aorta and the ascending vena cava in the chest were then tied simultaneously, the vessels arising from the arch of the aorta being free. This seemed to produce no effect, and no respiratory efforts were made by the animal for five minutes. The innominate artery and the left subclavian artery were then constricted, the aorta and ascending vena cava remaining tied. Respiratory efforts by the animal began in one minute and twenty-six seconds, although artificial respiration was maintained. These efforts ceased when the ligatures around the innominate and subclavian were loosened.

The ligatures were then removed from the descending aorta and ascending vena cava, and the innominate and left subclavian arteries were constricted, which was followed by respiratory efforts after one minute and six seconds. These efforts ceased when the vessels were freed.

The innominate artery alone was then constricted, but this seemed to produce no effect, no respiratory efforts being made by the animal for five minutes. At the end of five minutes, the left subclavian artery was constricted, the constriction of the innominate artery being maintained. The animal began to make respiratory efforts fifty-three seconds after constriction of the subclavian. These efforts ceased on loosening the ligatures.

Artificial respiration was then stopped, and the animal began to make respiratory efforts in ten seconds. The medulla oblongata was then broken up, and the experiment was concluded.

In this experiment I had the aid of my able assistant Dr. C. F. Roberts, and Mr. Gaspar Griswold, an advanced laboratory student. As the experiment progressed, it was ascertained that the vessels could be effectually constricted by making traction on the ligatures without tying. The constriction could then be instantly removed. It was also ascertained that constriction of the veins made no difference in the phenomena observed.

The general result of all my experiments made on the plan of the one just detailed was that invariably, when the innominate and the left subclavian artery were tied, the dogs began to make respiratory efforts in a little more than two minutes after the ligation, but the animals remained quiet after ligation of the aorta in the chest. The respiratory efforts continued so long as the vessels going off from the arch of the aorta remained constricted, and they ceased almost immediately when the ligatures were loosened. During all of my observations upon the effects of tying the various bloodvessels, artificial respiration was kept up constantly and efficiently. Under the view which I was led to adopt by the results of the experiments, viz., that the sense of want of air was due to a deficiency of oxygen-carrying blood in the medulla oblongata, I could not be certain that the arterial blood was entirely shut off from the medulla without tying the innominate and the left subclavian. It seemed to make no difference in the results of the experiments whether the great veins were tied or left free. In all of the experiments, the excitability of the medulla was repeatedly shown by arresting artificial respiration from time to time. The animals began to make respiratory efforts in from thirty to forty-five seconds after the arrest of artificial respiration.

The results of my experiments show that, when the flow of oxygenated blood is cut off from the parts supplied by the vessels given off from the arch of the aorta in a living animal, the sense of the want of air is excited —as is evident from the repeated and often violent respiratory efforts— although air is supplied to the lungs. Respiration will continue when all of the encephalic ganglia with the exception of the medulla oblongata have been removed; and it is well known that this (the medulla) is the sole respiratory nervous centre. We should naturally look, then, to influences operating upon the medulla oblongata for an explanation of these respiratory efforts. It does not seem that these movements can be due to an impression received by the medulla from the general system and due to want of oxygen; for, when the descending aorta is tied in the chest, no respiratory efforts are made. The movements, indeed, occur only when the medulla oblongata is deprived of blood; and the vessels which it is necessary to tie in order to produce this result involve a smaller part of the general systemic circulation than when the descending aorta is tied in the chest.

I do not assume that the view just enunciated is entirely novel, but, so far as I know, the observations made in 1877 were the first to sustain such a view by positive experimental evidence. Upon this point, I have nothing to add to what I have already stated in connection with the following quotations.[1]

"The first respiratory effort of the fœtus is thus produced by the interruption of the placental respiration, the sudden deficiency of oxygen and increase of carbonic acid in the blood (Schwartz). This change in the blood needs to take place locally only in the vessels of the medulla oblongata, in order to produce this effect; it occurs, for example, from arrest of the blood in these vessels (by ligature of the carotid arteries, Kussmaul and Tenner, Rosenthal, or by closure of the venous currents from the brain, Hermann and Escher), by which their blood becomes progressively poorer in oxygen and richer in carbonic acid" (Hermann, "Grundiss der Physiologie des Menschen," Berlin, 1870, S. 160).

"If the supply of blood be cut off from the medulla by ligature of the blood-vessels of the neck, dyspnœa is produced, though the operation produces no change in the blood generally, but simply affects the respiratory condition of the medulla itself, by cutting off its blood supply, the immediate result of which is an accumulation of carbonic acid and a paucity of available oxygen in the protoplasm of the nerve-cells in that region." (Foster, "A Text-Book of Physiology," New York, 1880, p. 377).

These quotations from Hermann and from Foster show clearly that their idea is that the sense of want of air is due to deficiency of oxygenated blood in the medulla oblongata, a view fully sustained by my own experiments. The observations of Kussmaul and Tenner, referred to by Hermann, were made with reference to the cause of the convulsions which so often occur after profuse and sudden hemorrhage. They are to be found in the elaborate memoir by Kussmaul and Tenner, "On the Nature and Origin of Epileptiform Convulsions caused by Profuse Bleeding," translated and published by the "New Sydenham Society," in 1859. Kussmaul and Tenner made a large number of experiments upon rabbits and horses, in which they observed the effects of tying the great vessels given off from the arch of the aorta. They noted, after this operation, great difficulty in respiration and violent convulsions. They did not, however, arrest the respiratory movements of the animal by artificial respiration, thus abolishing, for the time, the respiratory sense, and then note the effects of ligature of these vessels. The experiments by Rosenthal, which are referred to, are probably those contained in his work "Die Athembewegungen und ihre Beziehungen zum Nervus Vagus," Berlin, 1862. In these experiments, as I have already stated, it is shown that the respiratory efforts of an animal can be abolished by forcing atmospheric air or oxygen in large quantities through the lungs, but that the sense of want of air is felt when, in place of oxygen, nitrogen or hydrogen is employed, by this means removing the possibility of an irritation from carbonic acid. These are essentially the same as the observations made by Pflüger, in 1868. Rosenthal states very distinctly that the sense of want of air is due to want of oxygen-carrying blood in the medulla oblongata; but he does not actually demonstrate the truth of this proposition by experiments. The statements by Hermann and by Foster are apparently based upon the experiments of Kussmaul and Tenner and of Rosenthal; but I must nevertheless claim that the experiments which I have made upon this subject, which will be detailed farther on, if they should be confirmed, afford the first positive proof that the respiratory sense may be excited by cutting off the arterial supply from the medulla. There is nothing which I can find, in the experiments of Kussmaul and Tenner or of Rosenthal, which actually shows that the sense of want of air is not due to a want of oxygen in the general system.

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[1] New York Medical Journal, November, 1877, vol. xxvi. p. 452.

All the experiments that I have thus far referred to have of necessity involved placing the animals upon which the observations were made under conditions exceedingly unnatural. It cannot be assumed that, after the chest has been opened, the nerve-centres possess a degree of sensibility and a power of action entirely normal. Still, it is not easy to see how such a modification of the natural conditions can be avoided; and we must reason as best we can from the observations that have been made, keeping in view the experimental conditions.

It is certain that oxygen may be artificially supplied to the lungs in a living animal so efficiently as to abolish for the time the sense of want of fresh air to satisfy the requirements of the system for oxygen, and to cause all respiratory efforts on the part of the animal to cease.

When artificial respiration is arrested and the blood becomes dark in the arteries, when the blood is drained from the system, artificial respiration being continued, or when oxygenated blood is shut off from the medulla oblongata, the animal makes respiratory efforts.

Taking into consideration all the experiments bearing upon this point, they seem to show beyond question that, under the conditions indicated above, the sense of want of air, the stimulus, or whatever it may be that causes the animal to make respiratory efforts, depends upon some peculiar condition in the medulla oblongata.

Still, under the conditions mentioned; that is, an animal under the influence of ether with the chest opened and a bellows in the trachea, when artificial respiration is interrupted, the respiratory efforts begin in from thirty to forty-five seconds. We then have blood in the medulla oblongata, containing less oxygen and more carbonic acid than normal arterial blood and passing through the capillaries under great pressure, slowly and with difficulty. When, on the other hand, all the vessels given off from the arch of the aorta are tied, respiratory efforts begin in a few seconds more than two minutes. While this latter experiment, taken by itself, shows that shutting off the oxygen-carrying fluid from the medulla oblongata excites the sense of want of air, the question at once arises, why, when the vessels which supply the medulla oblongata are filled with blood of a venous character, is the respiratory sense excited so much more promptly than when the arteries are tied? In other words, if it be assumed that shutting off the blood from the medulla oblongata will excite the respiratory sense by cutting off the supply of oxygen, and that this will induce respiratory efforts in about two minutes, why does the simple interruption of artificial respiration, which causes blood of a venous character to go to the medulla oblongata, induce respiratory efforts in about thirty seconds?

This is a question which I have in vain attempted to solve to my entire satisfaction. When artificial respiration is arrested and the circulation is not interfered with by the tying of vessels, the venous blood passes through the lungs and back to the left side of the heart without losing its carbonic acid and without receiving a fresh supply of oxygen. Under these conditions, it passes through the great vessels given off from the arch of the aorta to the medulla oblongata as well as to others parts; and the main obstruction to the blood-current, which produces such intense engorgement of the cardiac cavities, exists in the systemic capillaries. It is fair to infer that the capillaries of the medulla are engorged as well as others. This being the condition, it is logical to assume that the oxidizing processes which normally go on in the medulla are promptly arrested; and it may also be assumed, for sake of argument, that this arrest of oxidation excites the sense of want of air. It does not appear how any experiment can be devised in which the venous blood could be admitted in such quantity to the medulla, at the same time maintaining the normal supply of oxygen and the uninterrupted performance of normal oxidation in this particular part.

On the other hand, suppose that the great vessels given off from the arch of the aorta be tied. While the supply of fresh arterial blood is thus cut off from the medulla, it is well known that the contraction of the vessels beyond the point of ligation—which is slow and gradual, as is characteristic of non-striated muscular tissue—will still force the small quantity of blood which these vessels contain, through the medulla. My experiments show that the supply of arterial blood to the medulla need not be very considerable in order to satisfy the respiratory sense. Constriction of the innominate artery alone does not induce respiratory efforts. No respiratory efforts are made when both carotids and both vertebral arteries are constricted. These efforts, indeed, occur only when the innominate and the left subclavian are tied, or when ligatures are applied to both carotids, both vertebrals, and both subclavians.

Reasoning from these facts and inferences, the following is the only explanation that I can offer of the rapid excitation of respiratory efforts by simple arrest of artificial respiration, as compared with the effects of tying the vessels given off from the arch of the aorta :—

When artificial respiration is interrupted, the normal oxidizing process in the medulla oblongata is promptly arrested and respiratory efforts begin in from thirty to forty-five seconds. When, on the other hand, the vessels which supply blood to the medulla are tied, the contraction of the muscular coats of the vessels beyond the points of ligation for a certain time forces a small quantity of arterial blood to the medulla, and it is only when this ceases that the want of oxygen is felt. This may be the reason why the arrest of oxidation in the medulla is later when the vessels are tied than when artificial respiration is interrupted.

When it is proven, as I think it has been proven conclusively, that an animal, after the respiratory movements have been arrested by artificial respiration, will make respiratory efforts when the supply of oxygen-carrying blood is shut off from the medulla oblongata, the question arises with regard to the application of this experimental fact to the mechanism of normal respiration.

Cause of the Normal Rhythmical Movements of Respiration.—The normal, rhythmical movements of respiration are excited and regulated by the medulla oblongata, which is the sole respiratory nervous centre. Under ordinary physiological conditions, the exciting cause of these movements, whatever it may be, is unconscious, and the muscular acts by which air is introduced into the lungs take place without efforts of the will. In other words, the movements of ordinary respiration are unconscious and involuntary. That these propositions are correct, has been proven by experiments that are perfectly familiar to physiologists. When all the nerve-centres that are known to have any relations to sensation and voluntary movements are destroyed, the medulla oblongata remaining intact, the rhythmical movements of respiration persist. When the medulla oblongata is destroyed, the other nerve-centres remaining intact, the respiratory movements are instantly arrested. The cause of this arrest of respiratory movements following destruction of the medulla is explained by the following proposition :—

The medulla oblongata is the only nerve-centre capable of appreciating the unconscious sense of want of air, and, consequently, when this centre is destroyed, the sense of want of air is not felt, and no true respiratory movements can be excited. In the same way, when oxygen is freely supplied to the blood of a living animal by artificial means, no sense of want of air exists and no respiratory efforts occur. In the fœtus *in utero*, so long as oxygen is supplied to the blood by the placenta, no respiratory efforts are made ; but, when the placental circulation is interrupted, the sense of want of air is developed and respiratory efforts occur. This may take place, as is well known, before birth.

My experiments, published in 1877, show most conclusively that the sense of want of air is developed and respiratory efforts are excited, not necessarily by a possible irritation due to the circulation of venous blood in the medulla oblongata, but by cutting off from the medulla the supply of oxygen. This occurs when the respiratory acts have been arrested by supplying air to the lungs artificially.

Under ordinary physiological conditions, the heart-beats numbering seventy-two, and the respirations eighteen per minute, the following is probably the mechanism of the flow of blood through the capillaries of the lungs and the vessels of the medulla oblongata:—

The venous blood from the general system is sent to the lungs by the action of the right ventricle, the intermittent force of which is destroyed by the elasticity of the pulmonary artery and its branches, until the current in the pulmonary capillaries becomes nearly or quite steady and continuous. This venous blood is poor or deficient in oxygen and rich in carbonic acid. As it passes through the lungs, it gives off its carbonic acid and appropriates oxygen. In the pulmonary parenchyma, the composition of the air is tolerably uniform; that is, it contains a certain proportion of oxygen and of carbonic acid gas. But, at the same time, the air in the pulmonary cells has a tendency to an increase in its proportion of carbonic acid with a diminution in its oxygen; for the venous blood, as it passes through the pulmonary capillaries, is constantly giving off carbonic acid and taking up oxygen. This tendency to a diminution in oxygen and an increase in carbonic acid in the contents of the air cells progressively increases from the completion of any single inspiratory act to the beginning of another. When, however, a new act of inspiration occurs, fresh oxygen is introduced into the lungs, which supplies the place of a certain quantity of carbonic acid thrown off by the preceding expiration. That this occurs is sufficiently evident; and it is illustrated by the fact that, when expiration is voluntarily retarded, the expired air becomes much richer in carbonic acid and poorer in oxygen than it is under ordinary conditions.

On the other hand, the left ventricle is sending arterial blood received from the lungs to all parts of the system, including the medulla oblongata. The elasticity of the aorta and of its branches gradually extinguishes or absorbs the intermittent force of the heart, so that the blood flows in a steady and continuous stream through the capillaries of the medulla. But, as the tendency of the air in the pulmonary parenchyma is to progressively increase its proportionate quantity of carbonic acid and to diminish its oxygen between two inspiratory acts, the tendency of the blood coming from the lungs and sent by the left ventricle to the medulla oblongata is to become progressively poorer in oxygen. After about four revolutions of the heart (assuming that the proportion of the beats of the heart to the respiratory acts are as four to one), the quantity of oxygen supplied to the medulla oblongata has become so far diminished that there occurs an unconscious sense of want of air, and this excites a new inspiratory act. So it is, in all probability, that the normal, rhythmical acts of inspiration are periodically excited; and anything, like violent muscular exercise, that increases the activity of the consumption of oxygen, of necessity increases the number of respirations per minute.

In my opinion, in the explanation just given of the cause of the rhythmical acts of respiration, we have gone as far as we can, in the present condition of physiological knowledge, without becoming involved in unprofitable speculation and in a discussion of hypotheses not justified by established facts. All that we can at present positively assume to be true, is that respiratory movements are excited by a want of oxygen in the substance of the medulla oblongata; and I know of no reasonable theory which will explain the exact mode of action of the oxygen of the blood upon any of the anatomical elements of the respiratory nervous centre. Still, it may not be uninteresting to refer to an explanation, proposed by Pflüger[1] in 1868, and advanced again in 1878 by Burkart, the substance of which is contained in the following quotation:—

> "1. The ganglionic cells of the respiratory centre produce, when there is a deficiency of oxygen, a readily oxidizable substance. 2. This substance performs its function, through a certain degree of production and accumulation, as a stimulus to the very cells that are concerned in its production. 3. The oxygen of the blood, that is of the tissues, operates against the production and accumulation, and consequently the stimulating action of this hypothetical substance thus restrained or removed. The capacity of the ganglionic cells to produce, in a greater or less degree, by a deficiency of oxygen, this substance which excites respiratory movements, is measured by the vital energy of the cells, as far as this vital energy, or better the energy of the process of oxidation, relates to the demand for oxygen on the part of the cells. The production of the hypothetical substance is merely the vital expression of the ganglionic cells of the respiratory centre through a deficiency in oxygen, and it ceases with the life of the cells themselves."[2]

The above quotation, which it was somewhat difficult to render into idiomatic English, embodies a theory which may be more clearly expressed as follows:—

The nerve-cells of the respiratory centre are constantly producing a hypothetical substance which acts as a stimulus to the muscles of inspiration. As the arterial blood passes through the capillaries of the medulla, its oxygen combines with this hypothetical substance, which is thus destroyed, or at least its action as a stimulus to the muscles of respiration is arrested. The quantity of this substance existing in the cells of the medulla is regulated by the supply of oxygen, and this regulates the degree of stimulation of the respiratory muscles. The production of this hypothetical substance is a manifestation of the vital energy of the cells, and this production ceases with the life of the cells.

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[1] Pflüger, Ueber die Ursache der Athanbewegungen, sowie der Dyspnoë und Apnoë. —Archiv für die gesammte Physiologie, Bonn, 1868. Bd. i., S. 90.

[2] Burkart, Studien über die automatische Thätigkeit des Athemcentrums und über die Beziehungen desselben zum Nervus Vagus und anderen Athemnerven.—Archiv für die gesammte Physiologie, Bonn, 1878, Bd. xvi. S. 436.

The theory which I have proposed involves the following simple propositions deduced mainly from my experiments published in 1877:—

1. When the respiratory nervous centre is fully supplied with oxygen by means of artificial respiration, this centre gives off no stimulus to the muscles of respiration and no respiratory efforts occur.

2. When there is a deficiency in the supply of oxygen to the respiratory nervous centre, the stimulus which gives rise to inspiratory efforts is generated, and this stimulus and the respiratory efforts which follow are active and vigorous in proportion to the extent and duration of the deficiency of oxygen.

3. In normal respiration, expiration being mainly passive, the rhythm and extent of the inspiratory acts are regulated by the quantity of oxygen supplied to the medulla oblongata. Thus, when there is a tendency to a deficiency of oxygen in the arterial blood, as its proportion must gradually and progressively diminish from the termination of one inspiratory act to the beginning of another, this need of oxygen, or unconscious sense of want of air, induces a stimulus which leads to the introduction of fresh air into the lungs.

4. As oxygen can get to the medulla oblongata only through the blood, serious disturbances of the circulation are always attended with an exaggeration of the respiratory sense, although the lungs may be freely supplied with pure air.

The theory of Burkart involves the assumption of the existence of a "readily-oxidizable substance" which the cells of the medulla oblongata have a constant tendency to produce and which the oxygen of the blood has a constant tendency to destroy. Burkart assumes that this hypothetical substance acts as a stimulus to the muscles of inspiration; I contend that we can go no farther in our explanation of the generation of the respiratory stimulus than to state the fact, which I have demonstrated experimentally, that the sense of want of air, be it unconscious, as in ordinary respiration, or conscious, as it is when we experience a sense of suffocation, is due to a deficiency in the supply of oxygen to the respiratory nervous centre.

Cause of the Conscious and Exaggerated Movements of Respiration in Dyspnœa.—In ordinary respiration, the sense of want of air, which is the starting point of the stimulus that gives rise to the respiratory acts, is entirely unconscious, and the acts of inspiration are involuntary and automatic. Even when there is a slight deficiency in the proper aëration of the blood, as occurs from the vitiated atmosphere of a crowded room, we experience merely an indefinite sense of oppression, and the respiratory movements are still of the same involuntary character. But when there occurs any serious interference with the passage of fresh air to the pulmonary parenchyma, or an obstruction to the flow of arterial blood to the medulla oblongata, as in certain pulmonary and cardiac diseases, the sense of want of air is exaggerated until we become conscious of pulmonary oppression or impending suffocation. Under such conditions, many muscles that are not usually brought into action in inspiration are used, partly by an effort of the will. This is simply an exaltation and extension of the normal respiratory sense, so that it reaches the true centres of sensation, causing a voluntary increase in the number and extent of the inspiratory acts. The sense of suffocation, indeed, differs from the normal unconscious respiratory sense merely in degree, and in the fact that the former operates on the centres of ordinary sensation through sensory nerves, while the latter is confined to the medulla oblongata. Having once ascertained definitely the cause of the normal sense of want of air, we can readily understand how an exaggeration of the conditions which give rise to the natural automatic movements of respiration may produce those sensations which attend the various degrees of suffocation. As more remote consequences of asphyxia, we observe insensibility, an arrest of the circulation by engorgement of the heart, and finally the sensibility of the medulla oblongata disappears. As a general rule, when the action of the heart has ceased from asphyxia, even the most efficient artificial respiration fails to restore the respiratory function, for the reason that it is only by the action of the heart that blood can be sent to the medulla. While, however, the heart continues to act, although its contractions may be very feeble, it is within the limits of possibility to revive the functions of the medulla by artificial respiration.

There are certain agents which seem to affect the medulla directly, such as narcotics and anæsthetics. In poisoning by opium, the frequency of the respiratory acts is diminished and they may be arrested. All experimenters must have frequently observed arrest of respiration by the administration of anæsthetics to animals. In such instances, if the heart continue to beat, it is generally possible to revive the respiratory function by artificial insufflation of the lungs. In most cases of suspended respiratory action from any temporary cause, although galvanism, sudden and active stimulation of the surface, etc., may aid in restoration, the main reliance should be upon persistent and efficient artificial respiration.

Cause of the first Respiratory Act after Birth and of Respiratory Efforts in Utero.—No one doubts, at the present day, that the blood from the placenta furnishes to the fœtus *in utero* all the oxygen demanded for the function of respiration ; and it is unnecessary to cite authorities to show that the blood of the umbilical vein contains oxygen, as this fact has long since been established. If the uterus of an animal far advanced in gestation be opened, an experiment which I have frequently made upon cats and dogs, the fœtuses for a time will make no respiratory efforts ; but compression of the umbilical vessels of one will cause it to make very violent movements of inspiration, while the others will remain quiet so long as the placental circulation is uninterrupted. The umbilical vein carries its blood to the vena cava ascendens, thence to the left side of the heart through the foramen ovale, and thence to the upper extremities and head, including, of course, the medulla oblongata. Thus the blood that is most highly oxygenated is supplied to the medulla; and the aorta below the arch receives, through the ductus arteriosus, the blood from the right ventricle, which contains a much smaller quantity of oxygen than the blood distributed through the vessels given off above. Cutting off the flow of blood from the placenta is almost equivalent, therefore, to tying the vessels of the arch of the aorta. When this is done, the flow of oxygenated blood to the medulla is arrested, and there follows a sense of want of air which induces a stimulus that is sent to the muscles of inspiration. Air is then for the first time taken into the lungs, and the conditions of the circulation are changed. The lungs are now distended with air, and the pulmonary vessels are dilated, so that the right ventricle supplies the pulmonary capillaries, instead of sending the venous blood, as before, in greatest part through the ductus arteriosus. The pulmonary circulation being thus established, the conditions rapidly assume the character observed in the adult.

It is evident, from the experiments already noted, showing the effects of compression of the umbilical vessels, that an abnormal condition *in utero*, in which there is serious interference with the placental circulation, may induce inspiratory efforts in the fœtus, and that the liquor amnii may thus find its way into the air-passages.

Are the Normal Respiratory Movements either entirely or in part Reflex, in the Sense in which the term Reflex is ordinarily understood by Physiologists?—This question is the one which naturally arises as a logical sequence of the experiments I have described and of the deductions that I have drawn from the ascertained facts. The most important of these facts is the following: When the medulla oblongata is freely supplied with oxygen-carrying blood in a living animal, this being effected by artificial insufflation of the lungs, there are no inspiratory efforts. The animal makes respiratory efforts as the supply of oxygen to the medulla diminishes; and the want of oxygen alone is capable of inducing the stimulus to the muscles, which gives rise to the efforts to introduce air into the lungs. It is evident that the stimulus, under these experimental conditions, which was formerly thought to be reflex and produced by a certain impression conveyed to the medulla by centripetal nerves, really takes its origin in the medulla itself; that the respiratory sense, so called, is due to some alteration in the conditions of the medulla, which depends upon the supply of oxygen-carrying blood; and, finally, that this alteration does not of necessity involve any impression received through afferent nerves. Viewed in this way, when a living animal, in which the respiratory movements have been for the time arrested by artificial insufflation of the lungs, makes inspiratory efforts following the operation of shutting off the blood-supply from the medulla, the stimulus which gives rise to these efforts cannot properly be called reflex.

I shall leave out of the question under consideration various modifications of the respiratory acts, such as coughing, sneezing, etc., and the influence of certain unusual impressions made upon the surface, as by a cold douche, restricting the discussion to the normal respiratory movements.

It is well known that a relatively strong galvanic current applied to the pneumogastric nerves in the neck or to certain branches of the pneumogastrics (the superior and the inferior laryngeals), will instantly arrest respiration. This action is reflex, as is shown by the fact that galvanization of the central ends of the divided nerves influences respiration, while the stimulus applied to the peripheral ends has no effect. The effect of powerful galvanization of the pneumogastrics and of certain of their branches is marked and constant; at the same time, galvanic stimulation of some of the nerves of general sensibility has been observed to arrest respiratory movements, although this result is not invariable. When the respiratory movements are completely arrested by galvanization of the pneumogastrics, it is always the same for the general movements of the animal, which remains motionless.[1] On the other hand, "a feeble excitation accelerates the respiration; a more powerful excitation retards it; a very powerful excitation arrests it. These words 'feeble' and 'powerful' having, it is understood, only a relative sense for any one animal, and under certain conditions: what is feeble for one would be powerful for another, etc."[2]

As far as we can apply these experimental facts to the physiology of ordinary respiration, it seems that the nerves, the action of which is brought into play under physiological conditions, must be mainly, if not exclusively, the pneumogastrics. These nerves have their origin at the medulla oblongata, which undoubtedly is the sole respiratory nervous centre; they are distributed to the entire respiratory apparatus from the larynx to the deepest parts of the lungs; they are the only nerves belonging to the cerebro-spinal system that are distributed to the larynx, trachea, bronchi, and the pulmonary parenchyma; while they are not distributed to the respiratory muscles, except the intrinsic muscles of the larynx, they are capable, by reflex action, of exerting a very marked influence over the respiratory movements. In discussing, then, the question of reflex nervous action in normal respiration, the argument may properly be confined to the pneumogastrics.

The curious and interesting respiratory phenomena observed in living animals after section of both pneumogastrics are very important. When both pneumogastrics are divided in the neck, the excitation directly produced by their section momentarily accelerates the respiratory movements.

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[1] Bert, Leçons sur la physiologie comparée de la respiratiou, Paris, 1870, p. 490.

[2] Bert, *loc. cit.*

In very young animals, in which the cartilages of the larynx are comparatively soft and pliable, the paralysis of the inferior laryngeal nerves, which preside over the respiratory movements of the glottis, often produce speedy suffocation from closure of the glottis during the inspiratory act; but in most adult animals the walls of the larynx are sufficiently rigid to enable the acts of inspiration to be carried on without serious obstruction. In such animals, for a few seconds, the number of respiratory acts may be increased, but as soon as they become tranquil, the number is very much diminished, and the movements change their character. The inspiratory acts become unusually profound and are attended with excessive dilatation of the thorax. Under these conditions, I have seen the number of respirations fall from sixteen or eighteen to four per minute.

In discussing the possible reflex influences upon the normal respiratory movements which may operate through the pneumogastrics, I shall make use of a very interesting suggestion made by Rosenbach, in 1878. In a brief note upon the "Influence of Stimulation of the Vagus upon Respiration," Rosenbach proposes the theory that this nerve (the vagus) is the vaso-motor nerve of the medulla oblongata, and that it contains fibres which contract, and fibres which dilate the bloodvessels. This idea is presented by Rosenbach simply as an hypothesis, which he "hopes later to be able to establish by experiments."[1]

I may now state, in continuing my argument, the following propositions, all of which, except the last, I assume to be facts that have been established experimentally:—

1. A deficiency in the quantity of oxygen supplied to the medulla oblongata through the arterial blood circulating in its substance will, of itself, give rise to a stimulation of the muscles concerned in the act of inspiration.

2. A relatively feeble galvanic stimulation of the pneumogastric nerves increases the frequency of the inspiratory acts; a stronger stimulation may diminish their frequency; and a very powerful stimulation arrests the respiratory movements. The action in these instances is reflex and not direct.

3. Section of both pneumogastric nerves in the neck, in most adult animals, very greatly diminishes the frequency of the respiratory acts.

4. The pneumogastric nerves possibly contain vaso-motor filaments which are capable of regulating and modifying the supply of blood to the vessels of the medulla oblongata.

If these propositions be taken as the basis of a theory of the mechanism of normal respiration, the following seem to be the natural and logical conclusions to be drawn from them:—

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[1] Rosenbach, Notiz uber den Einfluss der Vagusreizung auf die Athmung. Archiv für die gesammte Physiologie, Bonn, 1878, Bd. xvi., S. 503.

1. When the action of the medulla oblongata is removed from the influence of the pneumogastric nerves, as it is after division of both of these nerves in the neck, air is taken into the lungs when the deficiency of oxygen in the medulla has reached the point at which the respiratory sense necessarily generates the stimulus sent to the inspiratory muscles. This action is in no sense reflex, and it depends entirely upon the development, *de novo*, of a stimulation or an irritation in the medulla itself. Under these conditions, the acts of inspiration are abnormally infrequent, and they become excessively prolonged and profound.

In normal respiration, however, it is certain that important reflex influences operate upon the medulla oblongata through the pneumogastric nerves. While there can be no doubt that the stimulus which gives rise to inspiratory efforts is due purely and simply to want of oxygen in the medulla, in order that this stimulus shall operate in accordance with the requirements of the system for oxygen, producing normally from sixteen to twenty inspirations per minute, and varying the number of these movements with different physiological conditions of the organism, depending upon muscular exercise, etc., it is necessary that the respiratory acts should be regulated through the nervous system. Inasmuch as the respiratory acts involve the contraction of the striated muscular fibres, it would be expected that the nerves which regulate them should belong to the cerebro-spinal system. In studying experimentally the influence of various nerves upon the respiratory movements, it is found that the pneumogastrics, which arise from the medulla and are distributed largely to the respiratory apparatus, are closely connected with certain artificially-induced modifications of respiratory action. By applying to these nerves galvanic stimulation of different degrees of intensity, the respiratory movements may be increased or diminished in frequency, or they may be arrested, and these phenomena are always reflex.

Section of both pneumogastric nerves seems to remove the medulla oblongata, so far as its action as a respiratory nervous centre is concerned, from the reflex action of the nervous system; and the respiratory acts then become so far diminished in frequency and are so laboured as to produce serious pulmonary lesions. It is probable that death occurs in a few days after this operation, not alone from abnormal respiratory action, but from a suspension of other important functions which the pneumogastrics have to perform. It is possible, also, that some of the phenomena which are observed in narcotic poisoning, notably the great diminution in the number of respiratory movements, are due to an interference with the respiratory functions of the pneumogastrics.

The precise mechanism of the action of the pneumogastrics in normal respiration, and the exact seat and character of the impressions which serve as the starting point in the reflex phenomena observed, it is difficult to describe within the limits of ascertained facts. If the theory advanced by

Rosenbach be accepted; viz., that the pneumogastrics contain vaso-motor filaments which regulate the quantity of blood passing through the medulla oblongata, the mechanism of the action which takes place in the respiratory nervous centre is readily understood; but the seat and the exact nature of the impression which gives rise to these reflex changes in the calibre of the vessels are still a matter of speculation and conjecture. As far as muscular action in tranquil respiration is concerned, it is necessary to consider only the acts of inspiration, for expiration is produced mainly by the passive action of the walls of the thorax and by the resiliency of the elastic pulmonary parenchyma succeeding the action of the muscles which enlarge the chest and inflate the lungs.

Finally, the respiratory sense, *besoin de respirer*, sense of want of air, or the stimulus which gives rise to inspiratory efforts, is due purely and simply to a deficiency in oxygen in the medulla oblongata, which is the sole respiratory nervous centre. The frequency and the extent of the normal inspiratory movements are regulated and accommodated to the physiological requirements of the system by reflex action operating through the pneumogastric nerves.

In this article, I have endeavoured to set forth the nature and the physiological bearings of my experiments, published in 1877, showing that the sense of want of air is due primarily to a deficiency of oxygen in the medulla oblongata. I have attempted, also, to show how the operation of the stimulus to the inspiratory muscles, which is due to this deficiency of oxygen in the medulla, is regulated, in normal respiration, by reflex action through the pneumogastric nerves. Physiologists are now well acquainted with the functions of the pneumogastrics in connection with the circulation, the action of the stomach and intestines, and certain functions of the liver; but the action of these nerves in normal respiration and the causes of the respiratory phenomena following their galvanization and their section have heretofore been obscure. I venture to hope that my discussion of the reflex function of the pneumogastrics, in connection with the respiratory movements, has thrown some light upon questions which have not been fully understood by physiologists.

ARTICLE IV.

THE DIAPHRAGM: A PROTECTOR OF THE HEART AND CARDIAC VESSELS; ITS INFLUENCE ON THE ORGANS OF CIRCULATION.

A paper read before the College of Physicians of Philadelphia, May 8. By W. S. FORBES, M.D., Fellow of the College, Senior Surgeon to the Episcopal Hospital, and Demonstrator of Anatomy in Jefferson Medical College, Philadelphia.

ON opening the thorax and abdomen in living cats and dogs, while under the influence of ether, for the purpose of examining the motions of the heart, I have observed that the vena cava inferior opening through the pericardium and into the right auricle is held in a fixed relation to the vertebral column. Observing this fact I was induced to examine the vena cava inferior opening in the diaphragm, and its relation to the vertebral column in the human body.

I find that the vena cava inferior opening in the diaphragm of man is stationary, and holds a constant and fixed relation to the inferior part of the right antero-lateral margin of the ninth dorsal vertebra, and that it is not moved upwards nor downwards from its position by the surrounding organs in the performance of their function.

The diaphragm is a thin musculo-tendinous partition placed obliquely between the abdominal and thoracic cavities. It forms the floor of the thorax and the roof of the abdomen.

It is elliptical in shape, its largest diameter being from side to side. It consists of muscular fibres which arch upwards as they converge from the circumference of the abdominal cavity to the marginal under surface of a tendinous structure in the centre. The muscular fibres arise, in front, by two short muscular slips, one on either side of the middle line, from the ensiform cartilage of the sternum; those placed more laterally are attached to the inner surface of the cartilages and bony portions of the seven inferior ribs, interdigitating with the transversalis abdominis; behind they are attached to two aponeurotic arches, named the ligamentum arctuatum internum and externum; and on either side of the middle line posteriorly they are attached, by means of two thick tendinous crura, to the bodies and interposed fibro-cartilages of the upper lumbar vertebra; the one on the right side to the first, second, and third, and the one on the left side to the second and third lumbar vertebræ. The tendons of both these crura curve forwards and upwards and unite in forming an arch over the aorta, which is placed between the crura and in front of the vertebræ and under the tendinous arch. Muscular fibres spring from the anterior aspect of these tendinous crura in two thick bundles and diverge as they pass upwards to the aponeurotic centre. They are called the pillars of the diaphragm. The innermost muscular fibres of each crus pass upwards and inwards and thus decussate with each other, those of the right side usually lying anterior to those of the left side, and curving upwards they limit an opening for the transmission of the œsophagus before ending in the central tendon.

The ligamentum arctuatum internum is a fibrous band which extends from the body to the transverse process of the first lumbar vertebra, and arches over the upper part of the psoas muscle.

The ligamentum arctuatum externum extends outwards from the transverse process of the first lumbar vertebra to the last rib, arching over the front of the quadratus lumborum. From both ligamenta arctuata diaphragmatic muscular fibres take their origin, and are directed upwards to the posterior part of the tendinous centre of the organ.

The two short muscular fibres coming from the ensiform cartilage form a narrow slip on each side of which there occurs an interval, in which the lining membranes of the thorax and abdomen are separated only by a small quantity of loose connective tissue. Consequently we find here a weak point through which diaphragmatic hernia may take place.

The central tendon or cordiform tendon is a strong aponeurosis forming the central part of the diaphragm. It is elongated from side to side, and consists of three leaflets, partly separated by indentations; the right leaflet is the largest, the middle one is placed anteriorly, and the left which is elongated and narrow is the smallest of the three.

The central tendon is surrounded on every side by the muscular portion of the diaphragm, the fibres of which are directly continuous with those of the tendon.

There are in the diaphragm three large openings for the passage respectively of the aorta, the œsophagus, and the inferior vena cava; besides, some smaller holes or fissures which are less regular.

The opening for the aorta (hiatus aorticus) is not a complete foramen in the diaphragm, being an osseo-aponeurotic opening formed by the tendinous arch thrown across the front of the bodies of the vertebræ from the crus on one side to that of the other. It is, consequently, behind the diaphragm. It transmits the aorta, vena azygos major, the thoracic duct, and, occasionally, the left sympathetic nerve. It is the most inferior of the three openings of the diaphragm.

The œsophageal foramen is placed above, and, at the same time, anterior, and a little to the left of the aortic opening. It is elliptical in form, muscular in structure, and bounded by the muscular fibres coming from the two crura. Its anterior margin is occasionally tendinous. It transmits the œsophagus and the pneumogastric nerves.

The foramen for the ascending vena cava is the highest of the openings of the diaphragm. It is more or less quadrilateral in form, tendinous in structure, and placed posteriorly at the junction of the right and middle leaflets of the central tendon. Its margins are bounded by four bundles of tendinous fibres which meet nearly at right angles.

The right crus transmits the sympathetic and the greater and lesser splanchnic nerves of the right side; the left crus transmits the greater and lesser splanchnic nerves of the left side and the vena azygos minor. The serous membranes of the diaphragm are four in number, three lining its upper or thoracic surface and one its abdominal surface. Those on its upper part are the pleura on either side, and the serous layer of the pericardium, which covers the middle portion of the tendinous centre.

The serous membrane which covers the under surface is a portion of the general peritoneal membrane of the abdominal cavity.

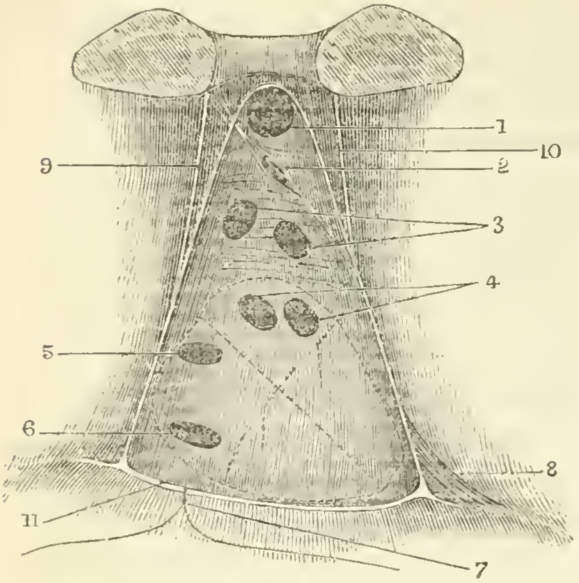
The diaphragm is arched, being convex towards the thorax and concave towards the abdomen. Its left portion is lower than the right by about three-quarters of an inch. It supports the base of the left lung and covers the great end of the stomach, the spleen, and the left kidney.

The right portion forms a complete arch from before backwards. It supports the base of the right lung, and is immediately over the convex surface of the liver. The central leaflet supports the heart, is higher in front at the sternum and behind at the vertebræ than the lateral leaflets.

The pericardium is a conical membranous sac in which the heart and commencement of the great bloodvessels are contained. The base of this sac is attached to the upper surface of the central tendon of the diaphragm; and on its anterior left side the muscular fibres of the diaphragm ascend on the pericardium and are attached to it, and in the new-born child play an important part to be hereafter described. The pericardium is a fibro-serous sac consisting of two layers, an internal serous and an external fibrous membrane. The serous membrane invests the heart, and is reflected on the inner surface of the fibrous membrane and over the upper surface of the central tendon of the diaphragm embraced by the fibrous membrane. The fibrous membrane firmly and intimately attached to the central tendon of the diaphragm ascends and converging forms a cone, at the apex of which the great bloodvessels issuing from and going to the heart are supported in their relative position by means of transverse and oblique bands of fibrous tissue which are continued on the walls of these vessels in the form of tubular prolongations, and which are gradually lost upon their external coat; the largest and strongest of these tubular prolongations is the one inclosing the aorta.

From the right and left external lateral surfaces of the fibrous membrane of the pericardium, and from near the apex of the pericardial cone, prolongations of the fibrous tissues continue upwards as strong bands, forming the antero-lateral parietes of the superior portion of the posterior mediastinal space and reaching the inner aspect of the first rib on each side, and coalescing with the thoracic fascia of Sir Astley Cooper, are held in a fixed position by this fascia which is stretched across the apex of the thoracic cone. These two strong bands continuous with the lateral portion of the pericardium thus form fibrous planes reaching from each side of the central tendon of the diaphragm to the bony apex of the thoracic cone. They form what may be called the superior tendinous crura of the diaphragm, upon the sides of which the phrenic nerves descend to reach the diaphragm; and by means of transverse and oblique bands of fibrous tissue connecting these tendinous crura together at and above the pericardial cone, a strong fibrous scaffolding is formed on which the great cardiac vessels are supported and protected. These superior tendinous crura of the diaphragm are inextensible. Each crus of the diaphragm is fixed above to the bony apex of the thoracic cone, and by fibrous connection, to the thoracic fascia of Sir Astley Cooper, which is stretched across the thoracic apex. The thoracic fascia of Cooper is supported above by the deep cervical fascia, which is strongly attached to the processes of the cervical vertebræ and to the stylo-maxillary ligament on each side of the base of the skull. "The thoracic fascia," writes Sir Astley Cooper, in his work on the Anatomy of the Thymus Gland, "performs three important offices: 1st. It forms the upper boundary of the chest, as the diaphragm does the lower. 2d. It steadily preserves the relative situation of the parts which enter and quit the thoracic opening. 3d. It attaches and supports the heart in its situation through the medium of its connection with the aorta and larger vessels which are placed at its curvature."

Fig. 1.



The above wood-cut represents a vertical section of the pericardium and diaphragm. The heart and the serous pericardium are removed showing the openings for the lodgment in the fibrous scaffolding: 1, aorta; 2, ductus arteriosus compressed in its elliptical opening, divided and turned up; 3, right and left pulmonary arteries; 4, pulmonary veins; 5, superior vena cava; 6, inferior vena cava opening into diaphragm. 7. Suspensory ligament of liver, the section is at a point midway between the cava opening in the diaphragm and the abdominal wall. 8, muscular fibres ascending on anterior left aspect of pericardium; 9 and 10, fibrous planes ascending laterally from pericardium to reach the apex of bony thoracic cone. 11, cordiform or tendinous portion of diaphragm below the heart.

In continuing downwards and connecting itself with the lateral and superior parts of the pericardium the thoracic fascia forms on either side a membranous continuity with the diaphragm, and in connection with that organ performs an important function on the circulatory apparatus.

The muscular fibres at the circumference of the diaphragm contracting, and the pericardial portion of the central tendon being fixed on a plane with the lower part of the body of the ninth dorsal vertebra, which cannot descend on account of the superior crura and the fibrous scaffolding which I have pointed out, the following parts are acted upon: the aortic arch of the diaphragm is drawn forward and made more free; the muscular œsophageal opening is contracted; the tendinous vena cava opening is held open to its fullest extent. Continuing to contract, the muscular circumference of the diaphragm now exerts its force on the pericardium and the superior crura or lateral fibrous planes, and upon the fibrous scaffolding between these crura, thus holding it open and tense, open to allow the flow of blood to and from the heart, and tense in order to protect the heart and bloodvessels, which if not protected would have their function greatly impaired by pressure on the part of the now expanding lungs. These functions of the diaphragm on the organs of circulation take place though the lateral portions of the diaphragm may not be permitted to descend on account of the contraction of the stronger abdominal muscles or from artificial restraint of the abdominal walls. The muscular diaphragm will contract on its own planes and still perform its functions for the benefit of the vascular apparatus, though it may be prevented from descending, thus extending the vertical area of the respiratory organs.

The right superior fibrous crus of the diaphragm is vertical in its direction. It is at the foot of this crus, and on its inner aspect, that we find the vena cava opening of the diaphragm. It is the right superior inextensible crus which holds up under the concave surface of the diaphragm the entire weight of the liver, an organ in the adult of four pounds avoirdupois. The falciform or suspension ligament of the liver is formed by two folds of the peritoneum reflected from each inferior lateral margin of the fibrous vena cava opening in the diaphragm down to the lateral margins of the vena cava fissure in the liver; the two folds meeting in front of the vena cava form the apex or point of the falciform ligament, which here is very short, holding the vena cava fissure in the liver close up to the vena cava opening in the diaphragm.

At this point, the apex of the falciform ligament, behind which the vena cava issues from its fissure in the liver to ascend to its diaphragmatic opening, the liver cannot descend. The base or anterior aspect of the falciform ligament is broad, and permits the anterior margin of the liver to fall and then to be elevated to and behind the ensiform cartilage by the action of the abdominal muscles. The lateral wings of the diaphragm and the muscular parietes of the abdomen in contracting and relaxing make lateral pressure upon the liver, and thus in a most positive manner advance the venous circulation and the flow of bile in the parenchyma of the liver, for the walls of the vessels in which these fluids are lodged have no muscular tissue.

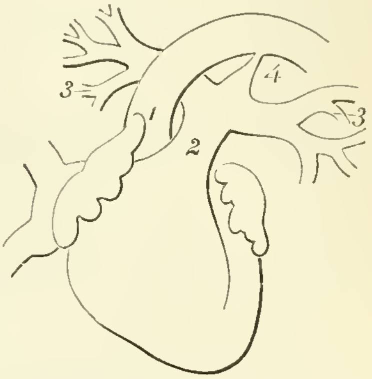
In the very young fœtus the thorax and abdomen form one cavity as in birds, reptiles, and fishes. The diaphragm in the fœtus is developed by a process of growth from the circumference to the centre, and when developed is in a passive state until birth. In the neonatus the muscular diaphragm is called into immediate action, and in contracting performs at once a most important function in compressing the ductus arteriosus, thereby diverting the current of blood into the two branches of the pulmonary artery, which go respectively to the right and left lung. The peculiarities in the arterial system of the fœtus are the communication between the internal iliac arteries and the placenta by means of the umbilical arteries, and the communication between the pulmonary artery and upper part of the descending portion of the arch of the aorta by means of the ductus arteriosus. In the fœtus and up to the birth of the neonatus the right and left branches of the pulmonary artery are, relative to the main pulmonary artery, very small, and come off from the posterior aspect of the artery while the ductus arteriosus is in front of them nearer the sternum, and is much larger, and is in fact the continuation of the main pulmonary artery to the arch of the aorta, into which it opens just below the origin of the left subclavian artery, and so conducts the current of blood from the right ventricle into the descending aorta.

The ductus arteriosus is lodged in an elliptical opening in the fibrous scaffolding beneath the descending portion of the arch of the aorta, which opening extends obliquely from above downwards and forwards and to the left, going in front of the descending aorta behind the "vestigial fold" of Marshall (which is formed by a duplication of the serous membrane between the pulmonary artery and the subjacent pulmonary vein), and above the left branch of the pulmonary artery. The tendinous fibres forming the margins of this elliptical opening embrace the ductus arteriosus and are connected to its external coat by connective tissue; they extend from the inner aspect of the superior posterior margin of the right fibrous plane or crus, downwards and forwards and to the left to become attached anteriorly and below to the inner surface of the left fibrous plane or crus, and the muscular fibres of the diaphragm contracting at the first inspiration at birth the tendinous fibres of the elliptical opening are made to compress the ductus arteriosus and eventually close it. Especially is this compression made by the contraction of those muscular fibres of the diaphragm which ascend upon and are attached to the anterior left aspect of the pericardium. The alternate pressure and relaxation made on the ductus arteriosus by the contraction of that part of the muscular diaphragm referred to is exactly similar to the procedure we now adopt in closing by pressure, sufficient for the formation of a clot, the main artery in cases of aneurismal tumours, and the effect in both instances is exactly the same; in cases of aneurismal tumours while the clot is being formed the collateral circulation is being established by the distension and permanent enlargement of the collateral branches on the cardiac side of the point of pressure, though these branches are lodged in far denser tissue than the undistended fœtal lung.

When the ductus arteriosus is being compressed by the margins of the fibrous opening in the fibrous scaffolding in which it is lodged, drawn upon by the muscular tissue alluded to, and while the clot is being formed, the right and left pulmonary branches going to the lungs are being distended and permanently enlarged until their united capacity is equal to the entire volume of blood in the main pulmonary stem, and thus the collateral circulation is eventually established with the aorta by means of the appropriate organs. The ductus arteriosus in the mean time is filled with the clot becoming organized, which permanently closes it. We may believe that in the case of the compressed ductus arteriosus, the collateral circulation with the aorta would take place though the lungs did not expand, just as the collateral circulation would be established on ligating any other artery, one in the extremities for instance. In short the expansion of the lungs, *per se*, has nothing to do with the closure of the ductus arteriosus. The expansion of the lungs is for the aëration of the blood, and they are made to expand by muscles of respiration independent of the descent of the diaphragm, and we may believe the closure of the ductus arteriosus and the collateral circulation with the aorta would be established by reason of the contraction of the diaphragm, though this diaphragm were restrained from descending.

The line of pressure exerted on the ductus arteriosus is nearer to the aorta than to the two branches of the pulmonary artery. The clot soon becomes firm and the closure of the duct is made complete by the eighth day.

Fig. 2.



Heart of infant showing the mode of disappearance of the ductus arteriosus after birth. 1. Aorta. 2. Pulmonary artery. 3, 3. Pulmonary branches. 4. Ductus arteriosus becoming obliterated. (After Dalton.)

The further influence of the muscular lamina, attached to the anterior left aspect of the pericardium on the fibrous surrounding of the ductus arteriosus, is observed in the future development of the branches of the pulmonary artery, for at maturity or in the adult the fibrous cord, the remains of the former ductus arteriosus, is found reaching from the aorta to near the root of the left branch of the pulmonary artery, the muscular lamina on the pericardium having drawn it in that direction away from its former situation in a line with the long axis of the main pulmonary artery. Sometimes, indeed, the fibrous cord is entirely removed by absorption following this pressure, and no vestige of the former organ is to be seen.

Such is the function performed by the contraction of the muscular diaphragm on the ductus arteriosus and on the pulmonary circulation of the new-born child. "*Post cor facile princeps.*"

When the lateral wings of the diaphragm, contracting, are permitted to descend, then and not until then do they tend to form a vacuum in the thorax, and thus assist to promote the venous circulation in the thorax and consequently in the whole venous system in the body. The first and most continuous effect of the contraction of the diaphragm, whether it is permitted to descend or not, is for the protection of the central circulatory apparatus, and the promotion of the circulation of the blood. If the diaphragm is injured the result of that injury is experienced first by the heart. This fact is verified in the clinical histories of injuries of the phrenic nerve and the diaphragm. Thus, it is well illustrated in the case recorded by Mr. Pollock in Holmes's *System of Surgery*, vol. ii. p. 650, as being under the care of Mr. Cæsar Hawkins, in St. George's Hospital. If one side of the diaphragm is lacerated, or if there is unilateral paralysis of the diaphragm, the heart is pushed over to the opposite side of the thorax by the expanding lung, the lateral fibrous scaffolding being no longer supported on the side of the paralysis. In bilateral paralysis the heart is pushed backwards by the lungs advancing in front of it, and during inspiration the epigastrium and hypochondria are depressed, the heart, with the pericardium and its attachments to the diaphragm in front and at the base of the thoracic cone, being carried backwards by lung pressure in front; the anterior and lateral attachment of the diaphragm cause the depression of the epigastrium and hypochondria, phenomena so characteristic of bilateral paralysis. Duchenne informs us that if in these cases the phrenic nerves be galvanized the diaphragm acts again with proper strength, and during inspiration the thoracic and abdominal walls rise simultaneously.

The descent of the diaphragm is not necessary to respiration, this is manifest from ordinary observation; but the contraction of the diaphragm, though it may not be permitted to descend, is necessary in order to protect the heart from the movement of surrounding viscera, and in order to promote the free circulation of the blood through the vessels forming the cardiac roots.

From this view, then, of the anatomy and functions of the diaphragm, this organ may be classed rather as an appendage to the circulatory apparatus, and not as the chief agent of respiration as heretofore believed. The natural history of the diaphragm would tend to confirm this view. It is found first in mammals. These animals require a diaphragm to protect the central organ of circulation from the encroachment of the neighbouring lungs and abdominal viscera, and by its contracting to act in promoting as well as protecting the functions of the heart. In birds and in turtles and tortoises, such an organ as the diaphragm is not required. In these animals the thoracic and abdominal viscera are in one and the same cavity, but the movement of the lungs is limited by means of pleural attachments, and the heart and its great vessels are protected by peritoneal folds which form restrictions by being attached to distant points of a rather fixed bony framework. In them the diaphragm is not found, as it is not needed.

In the foregoing remarks we have endeavoured to demonstrate that—

1st. The vena cava inferior opening, the highest point in the central tendon of the human diaphragm, holds a constant and fixed relation to the right anterior inferior border of the ninth dorsal vertebra.

2d. That portion of the central tendon embraced by the base of the fibrous pericardium is prevented from descending in inspiration by the superior tendinous crura of the diaphragm which are formed by the lateral parts of the fibrous pericardium ascending on either side in two planes to be attached to the apex of the bony thoracic cone and through the deep cervical fascia to the processes of the cervical vertebræ, and to each stylomaxillary ligament.

3d. These superior tendinous crura of the diaphragm are connected together by transverse and oblique fibrous bands, thus forming a fibrous scaffolding for the support and protection of the heart and the great cardiac vessels.

4th. The opening in the fibrous scaffolding for the lodgment of the ductus arteriosus in fœtal life is closed by the contraction of the muscular fibres ascending on the fibrous pericardium from the anterior left side of the diaphragm in the neonatus.

5th. The blood in the pulmonary artery of the neonatus is *forced* into and through the right and left pulmonary arteries and into the lungs by the contraction of the right ventricle, which at this moment has its walls as thick as those of the left ventricle, and by the elasticity of the pulmonary artery, and is not *drawn* into the pulmonary arterial branches and into the lungs by the expansion of the lungs.

6th. The superior fibrous crura and the fibrous scaffolding between them are made tense and open for the lodgment and for the protection of the heart and its great vessels, and for the promotion of the circulation of the blood through them by the contraction of the muscular diaphragm, independent of the descent of its lateral wings, though in the descent of the lateral wings of the diaphragm the vertical area of the thorax is extended.

7th. In the contraction of the muscular diaphragm its descent is not necessary as it contracts on its own planes, which may be supported by the contraction of the stronger abdominal muscles.

8th. The diaphragm is rather an appendage of the circulatory apparatus, and not "essentially the chief agent in respiration."

1409 LOCUST STREET, PHILADELPHIA.

ARTICLE V.

A CASE OF FISTULA OF STENO'S DUCT FOLLOWING GUNSHOT WOUND, SUCCESSFULLY TREATED BY DISSECTING UP THE POSTERIOR EXTREMITY OF THE DUCT AND CONDUCTING IT INTO THE MOUTH, AFTER THE METHOD OF LANGENBECK, WITH SOME REMARKS UPON THE TREATMENT OF SALIVARY FISTULÆ.

By ERSKINE MASON, M.D., Surgeon to Bellevue and the Roosevelt Hospitals, Clinical Professor of Surgery Bellevue Hospital Medical College, New York.

ON the afternoon of Sept. 8, 1870, I was summoned out of the city to see a boy fifteen years of age, who, a few hours before, had been wounded by the accidental discharge of his gun, which was loaded with duck shot. He was in the attitude of leaning over the barrel at the time the discharge took place. I found a large lacerated wound of the right cheek, which freely communicated with the mouth, and extended from the zygoma to the symphysis of the jaw. The lower jaw was fractured transversely just below its neck, and the ramus considerably comminuted as far as its angle. Several of the teeth had been removed, while the tongue was but slightly wounded. The inferior dental nerve was exposed for an inch or more in its course, and presented a ragged appearance. Hemorrhage had been quite profuse, but was arrested by Dr. Jay, who, fortunately, was in the vicinity at the time of the accident. The patient had suffered from severe shock, but reaction was being established when I reached him. Several fragments of bone which were displaced and attached by a mere thread of periosteum required to be removed; this was done with as little disturbance of the periosteum as possible, and the exposed and torn portion of inferior dental nerve removed close to its emergence from the bone. The other portions of the wound were carefully cleaned, and the wound communicating with the mouth was approximated by strips of adhesive plaster, and dressed with picked lint, wet in a solution of carbolic acid and glycerin (1 to 20). Under the care of Drs. John C. Jay and Lounsberry everything progressed favourably, and the next time I saw the patient was in my office, Oct. 11th. The wound of the cheek had all closed save a small opening which communicated with the mouth, and readily allowed the passage of a probe, and through which some saliva was flowing. There was considerable consolidation of the jaw at this time, and the patient could open his mouth for the space of an inch; though when this was done, or when he laughed, the jaw would deviate to the left of the median line. Fearing that unpleasant contraction of the soft parts would result if remedial measures were not now employed, and the jaw appearing sufficiently firm, I ordered that the mouth be frequently opened as wide as possible, and he begin to take solid food, chewing upon the left side, he having up to this period been living upon fluids; at the same time the soft parts on the affected side be frequently stretched by the introduction of the finger into the mouth. Had not this plan been pursued I fear that the fracture which had occurred in the vicinity of the temporo-maxillary articulation would have led to anchylosis, whereas, by this line of practice, we were enabled to secure a false joint just below the point where the ramus joins the neck.

His next visit was on Oct. 21st, when I found that he had gained considerably as to the movement of the jaw. A small piece of detached bone was at this time removed from the direction of the symphysis. He complained considerably of saliva escaping from the wound on the cheek while eating. Application of the nitrate of silver was at this time made to the fistula.

From this date he progressed very favourably in every respect, there being greater freedom in the mobility of the jaw and less trouble from the saliva flowing down the cheek. When, on the 29th of Nov., I was called to see him, he informed me that he thought he had taken cold a few days before, and was suffering from a swelling just behind the lobe of the ear. There being evidence of suppuration at this point, it was opened, and the cause of the trouble found to depend upon a piece of necrosed bone, which was removed, and from this he recovered in a few days. Nitrate of silver was again applied to the fistula, which, however, seemed to give but slight annoyance.

The flow of saliva from the fistula, however, eventually increased, and became a source of great trouble, and, when I saw him again in Sept. 1871, there were now two openings from which saliva trickled and produced some excoriation of the face. These openings were but a few lines apart, and seemed to be a little below the site of Steno's duct, though the location was close to the spot where the duct enters the mouth—as was readily determined by a very fine probe which could be made to enter the canal from within the mouth. This probe could be only passed just within the orifice, where it met with obstruction. These fistulæ were situated in a tract of cicatricial tissue. His condition was now such that some radical steps were necessary for the relief of this distressing feature in the case, and he, as well as his friends, were anxious for something to be done to change the course of the saliva. In conversation at this time with Dr. James R. Wood, in reference to the treatment of this variety of fistula, he related two cases wherein he had been successful in cutting down upon the duct at the site of fistula and turning it into the mouth. In considering the various features of my case, I preferred this to the one of using the seton, so disagreeable had it proved in two cases where I had seen it employed in the hands of others. Another reason was, that I feared that the presence of the seton in this case, passing as it would have to through feeble cicatricial tissue, might lead to sloughing.

On the 24th of Feb. 1871, assisted by Dr. Jay, I proceeded to cut down upon Steno's duct, which fortunately was readily found by laying open the fistulous tracks, and, with a fine probe as a guide, I then dissected out the cicatricial tissue around the fistula, freed the extremity of the duct, and turned it in through an opening into the mouth. The external wound was then brought together by wire sutures. The upper portion of the wound healed at once very kindly, though at the lower portion there was some suppuration, and I feared the result of the operation, as, on the fourth day, a drop or two of what I took to be saliva tinged with blood trickled from the lower portion of the wound. Suppuration, however, soon ceased, and the wound healed, leaving my patient free from salivary fistula.

At the time of the operation I did not know that I was putting in practice the means suggested and adopted by Langenbeck in the treatment of these fistulæ.

Where this operation is feasible, I think it is one that commends itself to the favourable attention of the surgeon, though in many cases no doubt a more simple form of procedure may obtain a cure. I have never had the opportunity of again testing this method, but should not hesitate to do so in a case where sufficient healthy duct could be obtained and where cicatricial tissue would militate against other methods, or, what I should prefer in some cases, the cutting out of the fistula by means of a punch, and closing the external wound by suture, as suggested by the late Dr. Horner; which, to my mind, is a better method than by seton, being devoid of its disagreeable features. I am well aware, both from the literature of this subject and personal experience, that very many cases of fistula of the parotid or its duct that come under our care as the result of wounds, may be induced to heal by the use of such simple methods as the application of the hot wire or the nitrate of silver associated with compresses, and in some instances by the introduction of probes through the canal; while some cases have healed spontaneously after a shorter or longer interval. The case of Col. Guiney, on page 330 of the *Surgical History of the War*, part first, is a striking example of the spontaneous closure of fistula of Steno's duct following gunshot wound, which took place one year after the receipt of injury.

In this connection the following case of fistula of the parotid gland resulting from a pistol-shot wound, recently under my care, is an example:—

W. D., aged 22, was admitted into Roosevelt Hospital Dec. 31, 1879, who, shortly before admission, received a pistol-shot wound in the right cheek, his assailant being about seven feet distant; the ball entering about one and a half inches behind and three-quarters of an inch above the angle of the mouth, passing in a direction backwards and slightly outwards to a point two inches behind and on a level with the lobe of the ear, at which site the ball was extracted. It passed through the masseter muscle, and, though grazing the bone, produced no fracture. A drainage-tube was introduced through the wound, and the parts syringed with a solution of carbolic acid. On January 4th saliva began to dribble from the posterior wound, though it also entered the mouth through its natural channel. The flow of saliva through the posterior wound was quite steady, and at times so profuse as to soak the dressings and trickle down the neck. The discharge began to abate on the 16th of the month, and on the 26th it had ceased, and the tube was entirely removed; the wound closed, and the patient was discharged, cured, Jan. 31.

During our late war it would appear (*Surgical History of the Rebellion*) that but few cases of salivary fistula were met with, though the records of wounds of the face are numerous; the methods adopted for their relief being those of occlusion, cauterization, and frequent dilatation of the excretory orifice of the canal of Steno. The reason of fistula not being more frequently met with after gunshot wounds was supposed to be due to the laceration produced by the projectile usually sufficing to obliterate the salivary ducts.

The variety of methods that have been put in practice for the cure of salivary fistula proves how difficult the management of some cases have been.

Cauterization, compression, and ligature of the duct for the purpose of causing atrophy of the gland, as proposed by Viborg, his experiments upon animals towards the close of the last century proving to him that there was no danger in the procedure, were among the earlier methods adopted.

Then follows the mode by seton, which has been varied greatly in its application. Either passed through the natural duct for the purpose of dilatation, or else passed through the mouth by means of a trocar through the fistulous opening, or through a perforation made by the hot iron or an awl; all these modes seeking to create a new channel for the saliva.

The idea of dilating the duct appears to belong to Morand and Louis, who introduced a fine thread guided by a probe into the natural orifice of the duct, and withdrew it through the wound; this seton was gradually increased in size. When the saliva passed freely into the mouth, and when the ulcer had contracted to the periphery of the seton, the foreign body was then removed, the ulcer touched with astringents, and compress applied till it closed.

By the other method, when a communication with the mouth has been well established, and saliva flowing in the proper direction, the seton being withdrawn, the extended edges of the fistula are found and brought together by suture.

In place of the old method of dilating the duct by means of silk threads as practised by Morand and Louis, or by catgut and leaden wires maintained in the canal, as employed by others; the introduction of fine silver probes used at varying intervals has been substituted with pleasing success. Mr. Francis Mason, in his work on the "Surgery of the Face," cites an interesting case of cure brought about, by passing a probe through the mouth so as to emerge from the fistulous aperture in the cheek, then having bent the instrument slightly it was pushed along the duct as far as possible towards the gland. It was left in this position for the space of eight hours, and the operation again repeated after three days. After the first introduction of the probe, saliva ceased to flow from the opening in the cheek. In some cases we fear it might be no easy matter to pass a probe in this manner through the upper opening of the duct, though its prompt success in this case merits its further trial.

Mr. Pick, in the *Lancet*, for February 19, 1870, relates the following interesting case:—

> A girl 20 years of age was admitted into St. George's Hospital for a salivary fistula, which she had had from childhood, the result of abscess. It was a source of great annoyance from the constant dribbling of saliva. An attempt to pass a small probe down the canal to ascertain if an opening existed into the mouth was made. By using slight force he succeeded in passing the instrument a short distance, perhaps half an inch, but no further. On account of the size of the probe he abandoned the operation till a finer one could be procured. The following morning no saliva flowed from the fistula; her pillow, which formerly had been wet, was found dry; and she had lost the dryness of her mouth, from which she had greatly complained. She was under observation for a week or ten days, during which time she remained well.

Mr. Pick justly remarks that this case illustrates how recovery may sometimes take place in cases which at times are most intractable and difficult to cure. The result of this probing was no doubt sufficient to remove some obstacle, probably a small calculus which had prevented a spontaneous closure of the fistula, hence the rapidly effected cure.

As salivary fistula may arise from so many causes, and present various features and sources of location, be it situated in the course of Steno's duct, or of the ducts in the gland itself, or as it arises from sloughing the result of ptyalism, or follows gunshot or incised wounds, each case may demand separate study and varied modes of procedure. Yet, from the remarks on treatment in most of our text-books on surgery, one might be led to believe that the seton was the only and all-sufficient method in dealing with these cases, many of which have been found quite intractable.

Perhaps of all the operations thus far resorted to, the one which would seem applicable to many cases, which is simple in its procedure, and devoid of the unpleasantness necessarily attached to the seton, is the one devised by our countryman, the late Dr. Wm. E. Horner, of Philadelphia. It not only proved successful in his hands, but in those of others. Dr. Henry H. Smith, in his work on "Operative Surgery," states he has operated by this method in two patients with perfect success, the external parts healing by the first intention.

The operation is thus described: The patient being seated, with the head well supported by an assistant, a strong broad wooden spatula is introduced within the cheek of the affected side; this is held firmly by the assistant. The wound being then slightly elongated by incising its sides in the line of the zygomaticus major muscle, a round punch, like that used by saddlers, should be placed over the fistulous orifice, care being taken to avoid the anterior edge of the masseter muscle. Then, on pressing the punch firmly against the spatula within the mouth, a piece of the entire thickness of the cheek will be removed, and a fresh opening made directly into the mouth. The external wound, being accurately closed by sutures and adhesive strips, will usually heal kindly, and the internal opening be found to give free vent to the saliva.

ARTICLE VI.

A CASE OF OVARIOTOMY IN WHICH PHLEGMASIA DOLENS FOLLOWED THE OPERATION.

By WALTER F. ATLEE, M.D., of Philadelphia.

MRS. S. S., of Trenton, N. J., thirty-three years of age, medium size, rather healthy appearance, eight years married, never pregnant, always regularly menstruated, consulted me on account of abdominal enlargement, in February, 1880. This enlargement, the patient said, began six years before, in the lower part of the belly on the left side, and gradually increased, so that her general health was now seriously affected by interference with functions essentially vital, those of digestion, circulation, and respiration. She told me she had been under local treatment by electricity for a long time, having had over forty sittings. Her pulse was about 120. The belly measured forty-two inches in its greatest circumference; it seemed to project rather more on the left side than on the right. Fluctuation could not be felt through the whole mass, but it could undoubtedly be produced over the central portion.

This history and these particular symptoms, together with those common to all ovarian cysts, made me diagnose a multilocular ovarian cyst of the left side, and I advised its extirpation at an early day.

The patient came to this city on the 7th March to be operated upon, but was seized with her monthly sickness one week too soon, for the first time in her life. We waited until Wednesday the 17th to perform the operation. The sac had some adhesions to the omentum; one so firm that it was cut away, and the cut end was left in the incision when sewed up; the contents were *very* viscid, and *very* dark coloured, and there was but one sac;[1] the ovary diseased was the right one; the pedicle was very thick so that it was difficult to apply the clamp; the Fallopian tube adherent to it was so enlarged as to be taken for small intestine by one of the assistants. Some of the contents of the sac escaped into the cavity of the abdomen, and were allowed to remain for reasons not necessary to mention. The walls of the sac were very unusually thick, and the inner surface was covered with vegetations (papillary growths[2]) of all sizes up to that of a walnut. The patient did perfectly well; the clamp was removed on Sunday; the bowels were freely moved on Wednesday by injections, the patient being allowed to get up on the commode; on Thursday she sat up; on Friday she was allowed to walk a few steps. On Saturday, the 11th day of the operation, there was complaint of stiffness and pain in the left leg, which was quite swollen, and in the course of the crural vein was felt a hard cord. These symptoms diminished so that the patient was able to return to Trenton on the fifteenth day.

Dr. Bodine, her attending physician in Trenton, writes me under date of April 29th as follows: "Mrs. S. is doing very well. The wound in the abdomen has entirely healed, and her leg swells only a little during the day, the swelling passing off entirely during rest at night. As an explanation of the attack of phlebitis I would suggest that during the winter and spring in this region we have an unusual number of cases of various forms of erysipelas, cutaneous, cellular, and in the form of felons, and that the relations of erysipelas and phlebitis are very close."

This complication of the operation for the removal of an ovarian cyst I had never before seen or heard of. In the last number (for May) of the *Medical News and Abstract*, is reported, from the *British Medical Journal* of March 13th, a very interesting and very successful case of ovariotomy performed during the sixth month of pregnancy without interruption to gestation, and in this report we read that the patient did extremely well until the fifteenth day after the operation, when she was suddenly attacked by phlegmasia dolens of the left leg (and, as in my case, it was the right ovary that was removed), accompanied by induration in the course of the femoral vessels from the groin to the popliteal space. The patient improved gradually, so as to have very good health during the last month of pregnancy. Dr. Galabin, of Guy's Hospital, who was the operator in this case, says:—

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[1] As said before, I had supposed the sac to be multilocular, because I could not cause fluctuation through it. The true reason of its not being caused, however, was that the force exerted by the hand in palpating through the thick coverings of the cyst, *and through the thick fluid*, was insufficient to set the fluid contents in motion.—See Guttman's *Handbook of Physical Diagnosis*, Syd. Society's Trans., p. 338-9.

[2] Dr. Joseph G. Richardson, to whom the growth was sent, says: "Thin sections from the nodule you gave me, from the inner surface of the wall of your ovarian tumour, show it to be made up of interlaced and convoluted compound papillæ covered with small columnar epithelial cells. Histologically these growths closely resemble papillomata and cylindro-cellular epitheliomata, but clinically they are distinguished from the latter by absence of any marked tendency to constitutional infection."

> "It is difficult to trace a direct causation for the phlegmasia dolens by which my patient was attacked fifteen days after the operation. If there had been any access of septic material, notwithstanding the carbolic spray, she would not have progressed so favourably for fourteen days after so severe an operation; and if the starting-point were inflammation near the pedicle, set up by the presence of the ligatures, it might have been expected that the right leg, and not the left, would have been affected."

Of course, in my case the presence of ligatures is to be left out of consideration altogether, in looking for the causes of the inflammation of the vein, and I am quite inclined to believe that the trouble did come from septic, or more properly, from *irritating* material, and see no reason whatever to doubt this from the fact that the cases did well for some ten days or two weeks. The irritating material was, I believe, the peculiar fluid in the sac, which in both cases had the same characters, and some of which, as before said in my case, got access to and remained in the abdominal cavity. Dr. Galabin says of this fluid that "it was not pale, but was stained by blood pigment to a deep reddish-brown," and "that the whole interior of the cyst was covered by papillary growth." The cysts and their contents had the same characters in these two cases, and I would attribute the extraordinary complication that attended them both, to the influence of the fluid that certainly escaped into the cavity of the abdomen in one case, and that may have done so in the other.

ARTICLE VII.

ON THE PHYSIOLOGICAL PATHOLOGY OF THE BLOOD.

By THOMAS WHARTON JONES, F.R.S., F.R.C.S., Professor of Ophthalmic Medicine and Surgery in University College, London; Ophthalmic Surgeon to the Hospital, etc.

IN a communication to the *Lancet*, two or three years ago, I showed that the process by which arrestment of bleeding from divided vessels in the bat's wing or frog's foot spontaneously takes place, as observed in detail under the microscope, is substantially similar to the process in the case of larger vessels of larger animals as explained by Dr. J. F. D. Jones,[1] in the beginning of this century. I pointed out, as Dr. Jones had done before, how cessation of bleeding is, in the first instance, owing to the mouths of the divided vessels becoming stopped up with clots of blood, and that this is favoured by the retracted and constricted condition which the mouths of those vessels themselves assume.

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[1] On the Process of Nature in Suppressing Hemorrhage from Divided and Punctured Arteries, London, 1805.

Coagulation of the blood, though in some respects a moribund manifestation, thus serves here an important preservative purpose, and may be appropriately accepted as constituting the first great point calling for consideration in a discussion of the physiological pathology of the blood.

The blood, as observed under the microscope, circulating within the vessels of the web of a bat's wing or frog's foot, for example, is seen to consist of the liquid plasma and the corpuscles—red and colourless—suspended in it.

The coagulation, which the blood undergoes after it has been drawn from the living body, is owing to a precipitation from the plasma of the stringy substance, named fibrin. This substance, according to the chemical doctrine at present prevailing, does not pre-exist as such dissolved in the plasma of living blood, but results from the combination of two different albuminous substances contained in solution in that fluid, namely *fibrinogen* and *fibrinoplastic.* The combination of these two substances to form solid fibrin, after the blood has been drawn from the living body, is supposed to be brought about by the agency of a ferment which is alleged to be derived from the contents of the colourless corpuscles of the blood set free by the bursting of those cells. Colourless corpuscles, however, do not really burst, though they collapse and undergo changes of shape by shooting out their wall in processes like the fingers of a glove. Their contents, therefore, are not evacuated.[1] And if a ferment, causing the combination of fibrinogen and fibrinoplastic to form fibrin, be generated in the blood, after being drawn from the body, it must be derived from some other source.

The fibres of the fibrin of coagulated blood are interwoven like a felt-work, in the interstices of which the corpuscles and serum are inclosed; but by and by the serum, which is the residue of the plasma, oozes out by the shrinking of the fibrin, whilst the corpusles are retained.

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[1] See the descriptions and delineations of this in my Papers on the "Blood-corpuscle" throughout the Animal Series in the *Philosophical Transactions* for 1846. Here, I describe two forms of colourless corpuscles, which I designate respectively, the granule cell in the coarsely granular stage and the granule cell in the finely granular stage. Both kinds are seen to undergo change of shape after the blood is drawn from the body, but the latter in a more remarkable degree than the former. Thus, in the blood of the frog, I remark at page 67 that the granule cell, coarsely granular stage, exhibits change of shape with movements of the contained granules similar to what we see in the corresponding cell of the skate's blood, though not in so pronounced a degree; but the granule cell, finely granular stage, rapidly undergoes a more marked change of form by collapse and shooting out finger-like processes. This looks at first like a bursting of the cell and evacuation of its contents, but that it is no such thing can be easily proved by insinuating a minute quantity of water under the covering scale of glass, whereupon the collapsed, though apparently burst, cell becomes distended and is seen to be still entire.

All this is well known, but for a correct conception of the intimate nature of coagulation, the form-changes which the histological elements of the blood undergo in the process, require to be studied microscopically. The examinations for this purpose are best made on newly drawn human blood; but preliminary to this, we must make ourselves acquainted with the microscopical characters of the histological elements as they appear in blood flowing within the vessels of a living animal.

For such observations, the web of the bat's wing or frog's hind foot is the part which admits of being most conveniently displayed under the microscope, so that the correlations of the stream of blood in the arteries, capillaries, and veins may be watched for a length of time and truly traced without the interference of such disturbance of the natural course of the blood as is necessarily occasioned when an internal organ—the mesentery,[1] for example—is drawn out and made the object of examination.

Here I beg to refer to Plate IV. in my Essay on the State of the Blood and the Bloodvessels in Inflammation in *Guy's Hospital Reports* for October, 1850, in which the appearance of the blood stream is represented in an artery, in capillaries, and in a vein of the frog's web. I beg to refer also to the Plate illustrating my paper on the Rhythmical Contractility of the Veins of the Bat's Wing in the *Philosophical Transactions* for 1852, in which the appearance of the blood stream is represented in arteries and veins.

The stream of blood in the artery appears pale red, and homogeneous in the axis where the red corpuscles keep together, colourless next the walls of the vessel, when there is nothing but plasma and a few colourless corpuscles, perhaps, in it, rolling or sliding sluggishly along.

In the capillaries, in which the flow of blood is slower, the red corpuscles are seen to pass along in single file overlapping each other. Colourless corpuscles occur here and there interrupting the series of red corpuscles or, without interrupting it, press it aside, as may be seen in both bat and frog.

The stream of blood in the veins being comparatively slower than in the artery, not only the colorless but also the red corpuscles may be individually distinguished; the former in greater or less number next the walls of the vein, the latter in the axis of the stream.

In the bat, when the flow of blood is much retarded, the red corpuscles may be seen to aggregate in rouleaux, both in capillaries and in venous radicles. Of this I have drawings made from the life before me.

In viewing the flow of blood in the venous trunks of the bat's wing, it is an interesting spectacle to watch the backward eddy of the blood corpuscles in the sinuses of the valves, when, during the systole of the rhythmically contractile walls of those vessels, the valves are thrown into action to prevent regurgitation.

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[1] The mesentery of the frog, it is to be remembered, contains no capillaries. Small branches, recurrent from the arteries proceeding to the intestine, open directly into veins returning therefrom, as I originally pointed out.

A colourless corpuscle may sometimes be seen adhering by a point to the wall of a vessel, and to be by the force of the stream, bearing on it, pressed into a pear-shape, so that it presents the appearance of a minute polypus attached by a peduncle. When sticking by a greater extent of surface, the corpuscle is seen pressed into the shape of a rain-drop on the window. (See the wood-cuts at page 14 of my Essay on the State of the Blood and the Bloodvessels in Inflammation, before cited.) The adhesion to the wall of the vessel giving way, as it is seen to do, the colourless corpuscle, thus set free, immediately resumes its globular form, and is carried along in the stream.

It is particularly to be observed that the change of shape which a colourless corpuscle sticking by a point to the wall of the vessel may be seen thus to undergo by pressure on it from without, has nothing in common, and must not be confounded with the intrinsic changes of form which the colourless corpuscles in blood newly drawn from the body are seen to exhibit, as a moribund action, from an inherent endowment of their substance, under the influence of the altered conditions in which they are placed. *Within the living vessels, colourless corpuscles never undergo any such metamorphoses.* To this I have to add, that I never saw colourless corpuscles escape from the vessels by boring through their walls or in any other manner.

The more or less stellate form, which colourless corpuscles in blood out of the body (the granule cell, finely granular stage, especially) usually assume, would obviously not be well adapted for boring through the wall of a vessel or pushing its way in the interstices of a tissue. (Refer to my Papers on the Blood Corpuscle throughout the Animal Series, before cited.)

On the surface of the frog's mesentery, numerous white corpuscles belonging to the peritoneal fluid are found. Some of these under the stimulating influence of the exposure to the air, I have seen shooting out a single process, and executing slight locomotive changes besides.

Whenever and wherever, in a much inflamed part of the web of a frog, I have seen corpuscles—white or red or both—free, the walls of the vessels in which they had been contained had already given way and disappeared, as described at page 51 of my Essay on the State of the Blood and the Bloodvessels in Inflammation, before referred to. In the cases in which there was no longer a distinct vascular coat to be seen, the boundary of the channel along which the blood continued to flow was composed of colourless corpuscles, unchanged in shape, accumulated like stones on the sides of a torrent which had subsided after an overflow.

Inflammatory congestion, in a spot, is seen to take place by the close aggregation of the red blood corpuscles, intermingled with colourless ones, blocking up the vessels, while the plasma, being thereby excluded, drains away in the stream. This aggregation of blood corpuscles, which may be seen in the bat (see my Paper in the *Medico-Chirurgical Transactions* for 1853, on the State of the Blood and the Bloodvessels in Inflammation of the Web of the Bat's Wing), as well as in the frog, ends in stagnation of the current. Notwithstanding this, the force of the blood from behind does not appear to bear heavily on the stagnant mass, but the stream glides gently off by the collateral branches of the artery above. The only indication of pressure is the oscillation of the blood in the vessel below the place, where the stream passes off, as in the case of a divided artery.

In the case of a divided artery, it is to be observed that it is at the further margin of the wound where the congestion is greatest. This is owing to regurgitation in the vessels to which the collateral branches of the divided artery lead; direct *vis a tergo* bearing but little on the blood in the vessels in the nearer side of the wound. It was long ago pointed out by Dr. Jones in regard to the current in large arteries, to which a ligature had been applied, that "the blood does not continue to be impelled against the extremity of the artery with the same impetuosity with which it flowed through the vessel before it was tied. The blood is immediately determined into the collateral branches above."

Apparently, under the erroneous impression that as much *vis a tergo* as before ought to bear on the blood stagnant in the vessels of an inflamed spot by the stream of blood in the artery or arteries leading to it, the same distinguished authorities who tell us that colourless corpuscles bore through the wall of vessels, allege as a *fact* that the red corpuscles may be seen to be squeezed out through the walls of the gorged vessels.

The reality, of what seems to be here referred to, is described in my Essay on the State of the Blood and the Bloodvessels in *Guy's Hospital Reports* for October, 1850, before cited, at page 49, under the head of Resolution of Inflammation, as follows: The agglomerated and stagnant mass of blood-corpuscles in the extreme arterial branches, the capillaries, and venous radicles, exposed to the force from behind in the artery leading to those vessels, is seen to oscillate, yielding a little at each stroke of the heart, and again recoiling. The agglomerated mass being at last pushed onwards a little, some of it protrudes into the free vessels (into which the congested ones have an outlet), the stream in which detaches and carries away the corpuscles. In this manner successive portions of the agglomerated mass are carried away until, at last, being reduced to a small bulk, it is all driven onward by the stream from behind into the stream in front, where it is broken up into its constituent corpuscles which are carried away.

This process of resolution of inflammatory congestion is accelerated when the artery leading to the affected spot becomes dilated so that more *vis a tergo* is permitted to bear on the stagnant blood. A demonstration of this phenomenon can be easily made, as I state in my essay so often cited, by applying some irritating drop, such as a weak solution of sulphate of copper with a little vinum opii, to a congested web of a frog, whereupon the artery, after being constricted a little, soon becomes dilated and the process of resolution proceeds. This fact I have over and over again adduced as an interesting illustration of the *modus operandi* of stimulating collyria applied to the conjunctiva for the cure of pustular and catarrhal ophthalmia.[1]

Having thus described the blood as it is seen within the small vessels of the living bat and frog, we have next to examine it when newly drawn. For this purpose we can make use of human blood; and here I may observe that as human blood is similar to bat's blood out of the body, except that the corpuscles of the latter are smaller, there can be little doubt that the blood within the vessels of the human body comports itself in all essential respects in a manner similar to what we have seen in the case of bat's blood.

I have before me three drawings of a small drop of human blood, as viewed under the microscope with an eighth of an inch objective and second eyepiece, which I made with special care. The blood, being placed on a slide, was covered with a thin scale of glass and forthwith observed. In the first figure the blood is represented as it appeared on being immediately examined. The corpuscles, both the numerous red and the few colourless, dispersed confusedly about in the plasma whilst the colourless were already beginning to collapse and shoot out processes. In the second figure the same portion of blood is represented as seen when examined in about a minute or two after being first displayed under the microscope. The red corpuscles have became aggregated together like coins in rouleaux; the colourless corpuscles scattered about free from any adhesion to the red corpuscles, and though more changed in form still entire—none of them burst. In the interspaces between the rouleaux of the red corpuscles, there were perceived on careful adjustment of the microscope fine, pale, colourless fibres, shooting in every direction close on the surface of the glass slide.

The transition from the state of matters represented in the first figure to that represented in the second takes place as follows: the red corpuscles first overlap each other in linear series, then rising up on edge become fully applied to each other, face to face. The rolls of red corpuscles thus formed are disposed section-wise and represent an irregular network. The colourless corpuscles remain dispersed here and there in the meshes of this network.

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[1] I have also over and over again indicated constriction of small arteries as the first step to the establishment of congestion in the capillaries and venous radicles to which they lead, but ignorance of the correlations of the flow of blood in the extreme arteries, capillaries, and venous radicles, has stepped in to prevent a comprehension of the process.

The fine, pale, colourless fibres which make their appearance on the glass slide soon after the aggregation of the red corpuscles into rouleaux are the fibres of fibrine which has been deposited from the plasma. The fluid that now remains in the interspaces between the rouleaux of red corpuscles is, therefore, serum only.

It is thus not until the red corpuscles have aggregated into rolls that the deposition of fibrin takes place.

The colourless corpuscles, though collapsed, have not burst, and therefore have not given out their contents. They were still the same in number after the fibrin had been deposited as before. The rapidity and closeness with which the aggregation of red corpuscles into rolls takes place is much promoted, as we shall see, by the quantity in the plasma of the albuminous materials which by their combination form the solid fibrin. After the fibrin has been deposited from the plasma, therefore, and nothing but serum remains, the red corpuscles cease to adhere tenaciously to each other so that the rolls into which they had aggregated tend to become broken up. This may be demonstrated by gently touching the superjacent scale of glass with the point of a needle. In consequence of the agitation thereby occasioned, currents of serum and loose corpuscles take place, but it is at the same time observed that many of the red corpuscles being glued by a single point to the glass slide through the medium of the deposited fibrin are, as represented in the third figure which I have before me, pressed into a pear shape by the force of the currents of serum and loose corpuscles bearing on them.

The arrangement of the rolls of red corpuscles in a network is exhibited *sectionwise* when the drop of blood is thinly spread out as above described. When, however, the blood in the form of a drop is examined under the microscope with a lower but good penetrating power, the rolls into which the red corpuscles become aggregated are observed to be disposed in every direction in the form of a *spongework*, in the interstices of which the plasma is contained. The fibrin next consolidating forms the feltwork, in the interstices of which are inclosed the rolls of red corpuscles now become more or less disrupted while the serum is gradually squeezed out.

Coagulation usually begins in three or four minutes after the blood is drawn, and is completed within ten minutes. Though, in a cupful of blood newly drawn by venesection, the red corpuscles by virtue of their greater specific gravity tend to subside, their complete subsidence is arrested by the deposit of the fibrin which entangles them in its meshes. Thus it is that the clot remains red at the surface as well as at the bottom.

In the blood drawn in certain states of the system—inflammatory states especially—a subsidence of red corpuscles takes place before coagulation commences, leaving the plasma collected at the top.[1] This is owing not to the plasma coagulating more slowly, but to the more rapid sinking of the red corpuscles. In such a case, plasma while still fluid may be skimmed off in some quantity with a spoon.

If a drop of fluid plasma thus obtained be transferred to a slide and thinly spread out by being covered with a scale of glass and examined under the microscope, colourless corpuscles in considerable number will be seen. The colourless corpuscles thus do not sink with the red ones, but remain suspended in the plasma. Here, again, we can clearly perceive that, however much they may change shape, they do not burst, and that the pale delicate fibres of fibrin we see by and by deposited on the glass slide (now in greater quantity than was seen in the examination of a drop of entire blood) are not derived from them either bodily or by any action of their alleged evacuated contents on the plasma as a ferment determining the combination of fibrinogen and fibrinoplastic to form the fibrin fibres.

Turning to the examination of the remainder of the plasma which was skimmed off and left to itself, we find it coagulated into a buff coloured or grayish jelly-like mass, from which serum, after a while, may be observed to separate as from ordinary coagulated blood. In this clot, we have a mass of fibrin unmixed with red corpuscles, but in which there are interspersed numerous colourless corpuscles. The fibres of this fibrin examined under the microscope, it is not difficult to identify with the pale delicate fibres which, as above shown, we observe making their appearance, by deposition on the glass slide from the fluid plasma.

The collection of plasma at the top in consequence of the rapid sinking of the red corpuscles in blood drawn in certain abnormal states of the system constitutes the condition on which the formation of the "buffy coat" depends; the buffy coat being simply the plasma with the colourless corpuscles which remained collected at the top, after the subsidence of the red corpuscles, now become coagulated.

The sinking of the red corpuscles in the plasma of blood drawn in acute inflammation used to be supposed owing to slower coagulation than natural; but the fact is that coagulation of such blood occurs often more rapidly. Moreover the subsidence of the red corpuscles in the plasma to a degree sufficient for the formation of a buffy coat is found to have already taken place long before the time when blood normally coagulates after abstraction. The explanation of the more rapid subsidence of the red corpuscles is this: The disposition of the red corpuscles to aggregate together in rouleaux is very much augmented in blood on which a buffy coat is about to form. So much so is this the case in respect to rapidity that with whatever haste the drop of blood can be placed for examination under the microscope, the red corpuscles are found to have already aggregated; whilst in respect to closeness of aggregation, it is very much greater than usual. The effect of this increased rapidity and closeness of aggregation is that, being quickly collected together in compact masses, the red corpuscles sink in the plasma long before coagulation takes place. Again, it has been found that the condition of the blood which determines this more rapid and close aggregation of the red corpuscles is a more viscid and plastic state of the plasma arising from an increase in it of the quantity of the albuminous substances which combine to form the fibrin. The number of red corpuscles is at the same time less than normal.[1]

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[1] This occurs normally in the blood of the horse, and affords a good opportunity of obtaining a drop of the plasma for microscopical examination, in order to find among the colourless corpuscles, examples of the reddish nucleated cell which I describe and delineate (in my Papers on the "Blood-corpuscle," above cited) in the blood of the horse and elephant. Here I ought to refer to Mr. Gulliver's beautiful experiments, showing that the sinking of the red corpuscles proceeds with accelerated rapidity in a sort of arithmetical ratio.

In some inflammatory states of the system the plastic condition of the blood is increased though not to so great a degree as to lead to complete subsidence of the red corpuscles before coagulation. In such a case, though there is no actual buffy coat, there is a large quantity of fibrin at the top of the coagulated mass which by shrinking causes excavation of the surface, a condition of the clot designated simple cupping.

In reference to the separation of the red corpuscles from the plasma, it is to be remarked that it does not appear to be exclusively a separation by mere subsidence of the former any more than the retention of the colourless corpuscles at the top depends on their mere swimming in the plasma. Whilst the red corpuscles have an attraction for each other, the colourless are attracted by the plasma. This we observed indicated in the blood, as before mentioned, while circulating in the vessels of the bat's wing or in those of the frog's web, by the tendency of the red corpuscles to keep together in the axis of the stream, whilst in the stratum of plasma adjacent to the walls of the vessels, there may often be seen accumulations of colourless corpuscles, but no red ones.

Within the vessels in the living animal—both bat and frog—the red corpuscles not only keep together but tend to aggregate into rouleaux when the blood flows slowly or becomes altogether stagnant.

In regard to the colourless corpuscles, they tend, as we have seen, to collect on the inside of the walls of the vessels, where the stream of blood is slow, but this depends partly on an adhesion between them and the walls of the vessels.

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[1] See my various observations on the formation of the "Buffy Coat" in the *British and Foreign Medical Review* for October, 1842, the *Edinburgh Medical and Surgical Journal* for October, 1843, and *Guy's Hospital Reports* for October, 1850.

Colourless corpuscles, as before said, never undergo any amœba-like change of form within the vessels, but no sooner is blood drawn from the living body and examined under the microscope than such a change is found to have already commenced. But this change of shape, let it be repeated, is unaccompanied by bursting of the cell. After coagulation of the fibrin has taken place and the colourless corpuscles are now surrounded by serum alone, they tend by endosmotic absorption of the thinner fluid into their interior to resume a round form.

To recur to the mode in which coagulation of the blood contributes to the stopping up of the mouths of divided vessels and thereby to the arrestment of hemorrhage: The blood coagulating as it escapes, the clot which is formed in and around the retracted and constricted mouth of the bleeding artery is retained more firmly in its place by the interlacement of the fibres of the fibrin with those of the surrounding cellular tissue.

The condition on which the stoppage of bleeding from an artery depends, namely, retraction and constriction of its mouth, the more speedy coagulation of the arterial blood, and the greater firmness of the clot which is formed, are commensurate with the force to be resisted. If in the case of veins those conditions operate in a much less degree, so also is the force of the current to be stemmed very much less.

On the state of the blood o' the body generally at the time of the infliction of a wound dividing vessels, whether there be a sufficiency or deficiency of fibrinous materials, the formation of an external clot of sufficient firmness to arrest the bleeding greatly depends.

When bleeding from an artery is arrested by the formation of an external clot or by the application of a ligature, the stream of blood passes off, as before mentioned, by the first considerable branch above. Between this branch and the mouth of the vessel which is stopped up with the external clot or secured by the ligature, the artery is filled with blood. This collection of blood which presented itself as a glomerulus of red corpuscles next the mouth of the vessels, but higher up, is seen to consist chiefly of plasma with colourless corpuscles suspended in it, Dr. Jones called the *internal clot*. Petit had long before, under the idea that it was as operative in the suppression of the hemorrhage as the external clot, called it *bouchon*, whilst the external clot itself he called *couvercle*. Dr. Jones, however, showed that the internal clot plays no part in the arrestment of the bleeding, its formation being dependent on that event.

What Dr. Jones called the middle clot is of a different nature from either the external or internal clot, being composed of *exuded lymph*. The walls of the artery at the place of division, or at the place of ligature, becoming inflamed, this lymph is exuded and penetrates between the external and internal clots, or where the bleeding has been arrested by ligature, between the latter and the internal clot.

It is by the middle or lymph clot alone that the divided or ligatured artery becomes permanently closed, as was demonstrated by Dr. Jones. In the case of microscopical arteries, we see in the web of the frog that there is no special middle clot exactly, but the lymph exuded into the wound constitutes the material for the closure of the mouth of the vessel, as well as for the healing of the wound of the web.

Eventually the part of the artery occupied by the internal clot, and through which blood no longer flows, degenerates into a cord of cellular tissue, like what takes place in the case of the *ductus arteriosus*, *ductus venosus*, and the *umbilical arteries*, when the stream of blood is diverted from them.

A slough of the web of a frog having become detached, the network of vessels at the margin of the living part comes to present all the characters of a capillary network. The larger vessels, which have been truncated by the separation of the slough, become obliterated as far up as their connection with some considerable branch above, which now comes to represent the continuation, as the case may be, of the artery or principal radicle of the vein.

In microscopical examinations of frogs in which there existed sloughing and ulceration from inflammation excited by previous injury, I have often seen suddenly appear, in an artery of the sound web, glomeruli of red corpuscles, followed by loose flakes of fibrin holding together colourless corpuscles. Such glomeruli and flakes would perhaps block up the vessel for an instant or two, and then be forced on by the stream from behind, but to be succeeded by others. This appearance—of which I have drawings in my note-book before me—resembled somewhat the appearance within the caudal vein of the eel, of successive drops of red blood separated by the drops of lymph propelled into that vessel by the lymph heart.[1]

The embola referred to seem to be so many internal clots formed in the manner before described in connection with local congestions and stagnations, now become free in the general circulation, and similar, I believe, in their nature to the embola which are liable to occur in the human body after operations. They may block up any artery; but becoming at length diminished in bulk by successive disintegrations, as I have seen in the frog, they may eventually cease to cause any further obstruction. When, however, they happen to accumulate in and block up the pulmonary artery, death may be occasioned, as Sir J. Fayrer has found to be often the case after operations in India.

Sometimes I have seen only a grayish granulous plug consisting of colourless corpuscles held together by a tenacious looking fibrinous substance. A similar plug may be produced *at will* in the bat as well as in the frog, by pressing pretty firmly with a blunt point over an artery or vein under microscopical observation.

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[1] See my Paper entitled "The Caudal Heart of the Eel, a Lymphatic Heart," in the Philosophical Transactions for 1868.

The separation of the red corpuscles from the plasma, and consequently the formation of the fibrinous clots found in the heart and vessels after death, depend on the state of the blood before death in a manner similar to that which obtains in the formation of the buffy coat. Thus, in the bodies of persons who had died of pneumonia, inflammation of serous membranes, etc., in which the quantity of fibrinous material in the blood is increased and the disposition of the red corpuscles to aggregate consequently greater, the clots formed in the heart and large vessels were found by Rokitansky numerous, compact, and free from red corpuscles. Again, in cases in which, though there was no inflammatory alteration of the blood before death, the red corpuscles have been found to occupy the lower part of the clot corresponding with the most depending part of the body as it lay after death, so that here the separation had taken place by mere subsidence, in consequence of the greater slowness with which the blood coagulated within the vessels.

Article VIII.

Gastro-Hysterectomy, or the Recent Modification of the Cæsarean Section by Dr. Porro.

By Isaac E. Taylor, M.D., Emeritus Professor of Obstetrics, and of the Diseases of Women and Children, Bellevue Hospital Medical College, New York.

I select the word Hysterectomy as it expresses the true meaning of the act, the ablation or the removal of the uterus and ovaries, after the Cæsarean section is performed. Hysterotomy simply implies an incision without removal.

The medical profession are under many obligations to Dr. R. P. Harris, of Philadelphia, for his very valuable papers on the Cæsarean section, especially the last two, published in the *Americal Journal of the Medical Sciences*, for January and April, 1880. No writer has given more time, unwearied investigation, and closer attention to this important subject, and his information has been derived from various sources, not only in America and the British Isles, but also Continental Europe.

From his last two papers we glean that it is an absolute necessity, if the operation is to be successful, it must be attempted or resorted to as early as possible, or as early as the nature and circumstances of the case will admit, not only for the benefit and welfare of the mother, but of the child. Dr. Thomas Radford was a strong advocate for an early performance of the operation. It is however to Dr. Harris's untiring zeal, and to his able exposition of statistical information, that we are indebted for the conclusive proof that it should be performed early.

> "If," he says, "we persist in the delay of the last ten years, it will make but very little difference what operation is performed, there must be a frightful mortality. To think of twenty-six deaths in thirty-two operations, is a sad reflection, but the result is not to be wondered at, when twenty-four of the women were not operated upon till it was too late to have any but the faintest hope of success except in a few instances, these labours lasting from one day to two weeks, and a large number being two, three, or four days under this fruitless and exhausting process. Early cases tell the story of the last decade's failure."

The deduction from these remarks of Dr. Harris exemplifies how truly and decidedly they affirm and corroborate the true obstetrical law as recognized by the profession.—That in any case of natural labour which continues over twenty-four hours, the unfavourable results will be to the mother as one to six deaths, and for the child as one to four.

If nature pressing on to twenty-four hours shows such an unfavourable issue, what must be expected from any kind of instrumental delivery, or the Cæsarean section, either by the older method, or the recent modification, or laparo-elytrotomy?

The true and best test of these capital procedures is the result in cases in which the operation is performed early, and the correct appreciation from the statistical information respecting the operation should be from cases of that nature; unfavourable or almost moribund cases when the operation is resorted to should be excluded from the statistics.

The last report of Dr. Harris on the Porro operation shows that up to that time, April, 1880, there had been thirty-six cases operated upon, of which one-half were saved and one-half died. By rejecting or excluding those cases which were unfavourable owing to labour having existed for a long while, or through an exhausted condition of the system, the proportion would be materially changed, and would be as eighteen to eleven, nearly sixty-two per cent. saved.

In his article "On the Porro Modification of the Cæsarean Section in Continental Europe" (*American Journal of the Medical Sciences*, April, 1880), Dr. Harris descants on the valuable and original physiological experiments of Blundell in 1823 on rabbits recently delivered, and where the uterus was extirpated in four instances, three of these were successful and the fourth died. From these experiments Blundell presents the question to the profession: When the Cæsarean operation is performed, or when a patient is evidently sinking after a rupture of the uterus, might not the whole uterus be taken away? The physiological experiments of Prof. Porro in 1874, on the gravid uteri of rabbits, were made fifty years after those of Blundell, and the first practical illustration on record on the human subject was by Prof. H. R. Storer, of Boston, on Mrs. H., for fibro-cystic tumour of the uterus, complicated with pregnancy, and published in the *Gynæcological Journal of Boston*, by Dr. G. H. Bixby, October, 1869.

In his article Dr. Harris puts the question to the American medical profession, "Shall we adopt the Porro method of operating in the United States?" As many members of the profession may not be acquainted with the origin, the nature, and the manner of the operation as performed by Prof. Porro, of Pavia, Italy, a reference to his operation may add some interest to the subject under consideration, especially as the uterus had been extirpated before by Dr. Storer. Dr. Storer's claims appear to have been set aside or ignored by some of the Continental operators. Dr. Welponer, of Vienna, and Dr. Wasseige, of Liege, Belgium, consider the operation to have been purely an accidental one, arising from the nature of the case—a large fibro-cystic tumour blocking up the pelvic cavity, and admitting a space of only one and a half inches for the delivery of the woman. "We exclude," says Wasseige, "from the statistics the case of Storer, because the extirpation of the uterus was done with another object." The reasons assigned by Dr. Storer were the following:—

1st. That with the mechanical interference by the tumour the escape of the fœtus per vias naturales was utterly impossible.

2d. That the space of less than one and a half inches would not admit of either craniotomy, cephalotripsy, or cranioclasm, or any other mechanical interference per vaginam.

3d. That Cæsarean section in accordance with the views of all authors was clearly indicated as the only result; provided it were possible to remove the tumour by abdominal section.

After gastrotomy, the fibro-cystic tumour was opened, and found in a state of considerable degeneration.

> The hemorrhage being already very profuse from opening the tumour, as Dr. Bixby says, and the danger from shock and exhaustion being imminent, Dr. Storer extended his incision into the cavity of the uterus, and with all expedition removed the child and the placenta, which was also in a state of decomposition.
>
> There was little time to be lost, for the hemorrhage was perfectly frightful from the incision into the muscular structure of the uterus, together with the other vessels at the site of the placenta, and it was evident that the irregular contraction of the uterus could not staunch. Accordingly a large-sized trocar was passed through the upper segment of the cervix uteri, and a metallic cord passed doubled through its canula, the whole was firmly tied in two parts. Fearing that this might not be secure, the chain écraseur was applied, and the mass slowly removed. Dr. Storer's clamp was then used. The external wound was closed by ten metallic sutures. The patient died in sixty-eight hours after.

The removal of the uterus in this case was attempted in consequence of the tremendous hemorrhage owing to the exceedingly vascular structure involved, and which would not apply in many, if any, of the simple uncomplicated cases of pregnancy. It was therefore on the part of Storer an ulterior object, and not an original intention of the operator. I have intentionally presented the particulars of Storer's case, so that a just and correct opinion may be formed respecting the true nature of it. Dr. Storer nevertheless did perform the first operation for the extirpation of the pregnant uterus. Storer's case was unsuccessful, as might be reasonably expected, but it was done to save the woman as the last hope. It is possible, therefore, that this formidable operation would from that instance alone, never have been recorded as one for adoption, or advocated as a modification of the Cæsarean section.

The operation of Prof. Porro was in this manner :—

> "A dwarf, a primipara 25 years of age, four feet nine inches high, entered the obstetrical wards of the Hospital of the University of Pavia. She suffered severely with rickets when a child, and her pelvis became very much deformed. May 21, 1876, was taken in labour. Waters broke with the first pains, and after their continuance for six hours and forty minutes the Cæsarean operation was performed by Dr. Porro, and a living child removed.
>
> "The uterus contracted, but not sufficiently to close the sinuses in the incised portion, and much blood was escaping from one edge of the wound. No effort in any way was made to arrest the hemorrhage, to enable the organ to contract, or to close the womb by sutures. The operator at once decided to extirpate the uterus, which he did with a strong wire and serre-nœud, placing the loop around the cervix opposite the inner os, and then tightening it. He then cut away the uterus by the scissors, passed a long drainage tube through Douglas's cul-de-sac, brought the cut cervix to the abdominal wound, and closed the abdominal incision with wire sutures.
>
> "The operation commenced at 4.49 P. M ; operation, nineteen minutes ; sewing up, seven minutes ; medication, eight ; operation proper, twenty-six minutes."

Prof. Porro's operation proved successful, and the credit of having performed the first successful case of gastro-hysterectomy in a parturient women, without any complication, belongs to Porro. Had the patient of Porro died, as Storer's did, it is possible, independent of the valuable experiments on rabbits, and suggestions of Blundell in 1823, and of Porro in 1874, and others, the profession would, probably, never have heard any more of the new modification of the Cæsarean section, and we would not at the present time, but for the successful issue of Porro's case, be considering its advantages over the old style.

Since the publication of his paper, in the April number of the *American Journal of the Medical Sciences*, which includes only 36 cases, in a letter dated April 22, Dr. Harris informs me that he has increased the European list by 12 more cases, making, with the two American cases (Storer and Taylor) the whole number, at this time, 50 cases, of which forty-nine were operated upon in the last four years.

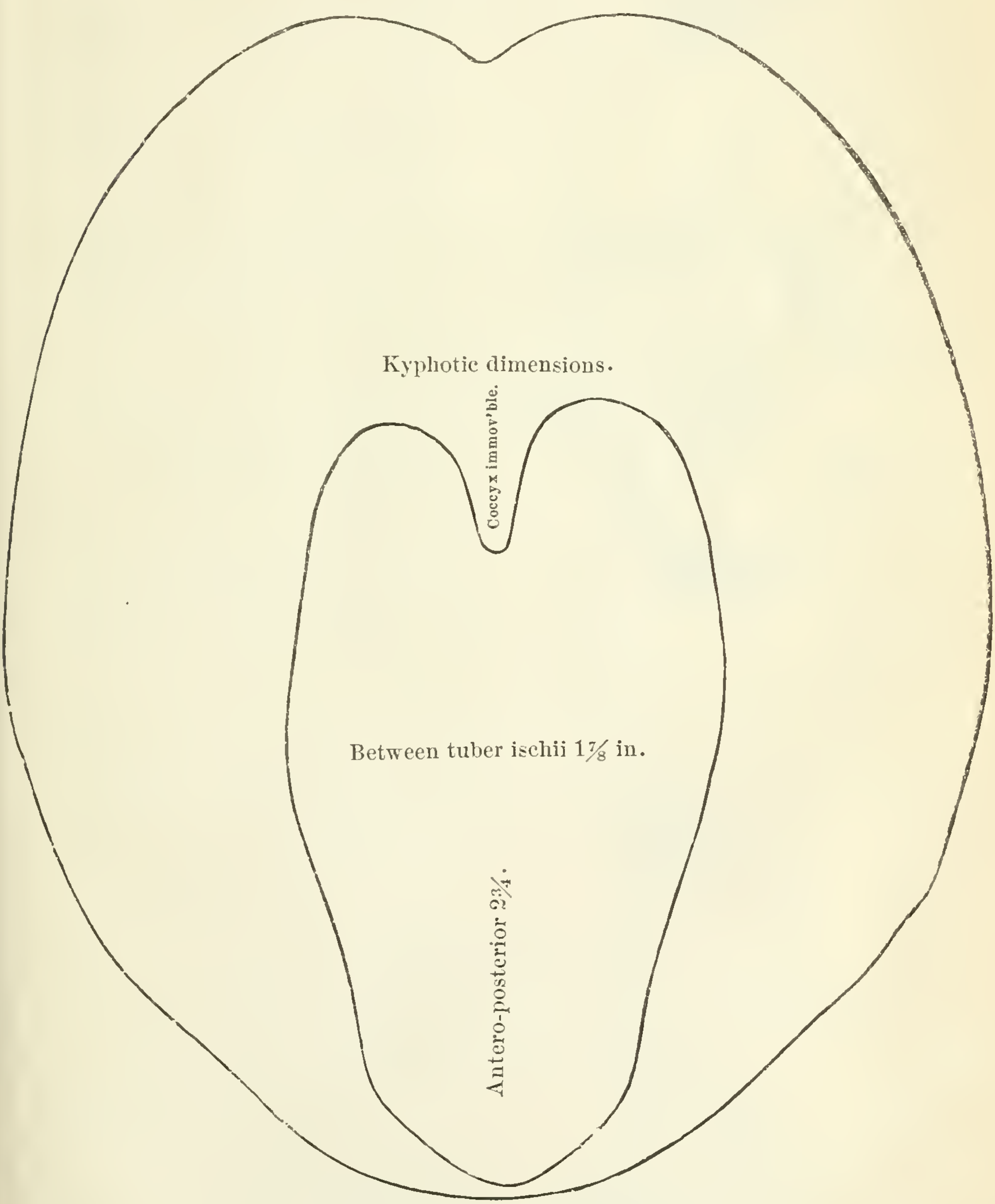
The 50 operations are divided as follows :—

United States . . .	2	Operations.	0(?1)	Women	saved.
Italy	23	"	8	"	"
Austria	11	"	6	"	"
France	7	"	4	"	"
Germany	4	"	0	"	"
Belgium	2	"	1	"	"
Switzerland . . .	1	"	1	"	"
Total	50	"	20(?21)	"	"

Austria may possibly be entitled to 7 cures. No operations in Russia.

In marked, and I may say, very favourable contrast to these, we have the statement of Prof. Chiara that out of 62 operations, old style, performe by Porro, Billi, Lazzati, and himself, all had proved fatal but three (3), which were saved by Billi out of his 37 cases. The balance, 25, under Porro, Lazzati, and himself, were all fatal; the proportion being as 1 woman saved to 21. The recent modification giving the proportion as 1 to $2\frac{1}{3}$, and this in continental Europe, where there are so many cases of deformities presenting themselves. The success, therefore, of the new departure is remarkable and very great.

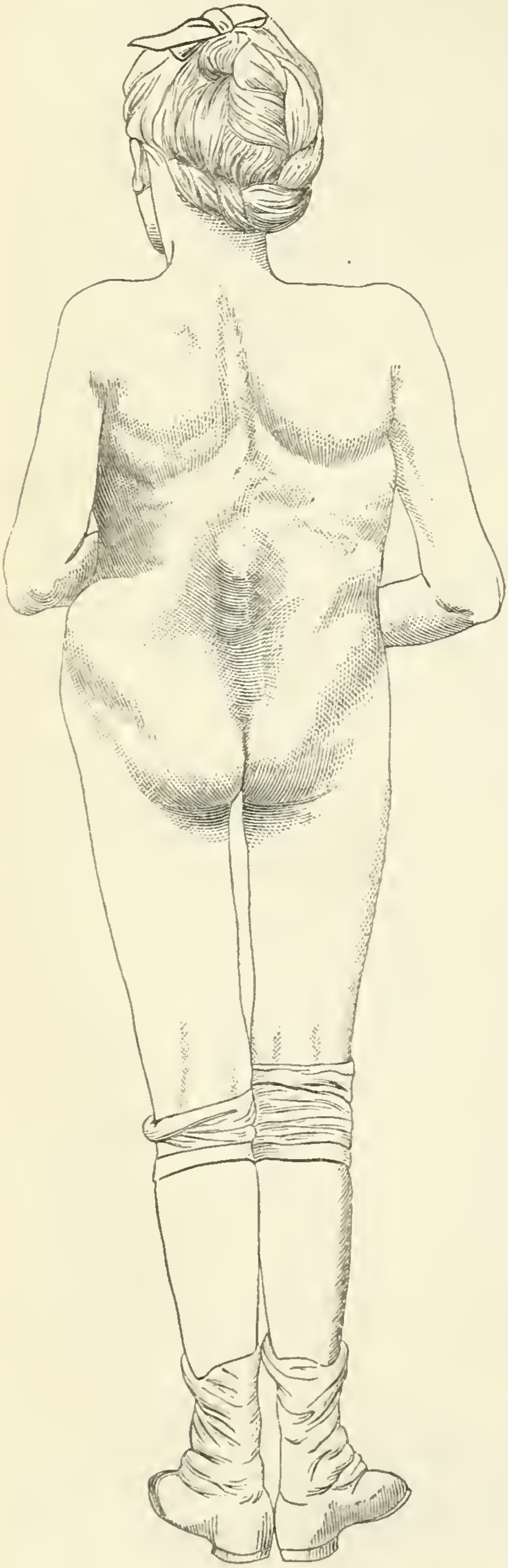
Fig. 1.



Kyphotic pelvis (outlet) of Mrs. V.

CASE.—In the early part of December, 1879, Mrs. Vallentine called on me and stated that she was four and a half months advanced in pregnancy, and that she had decided with her husband and her mother that she wished to have a living child; that she did not desire to undergo the former kind of operation, and have the child sacrificed. I had operated on Mrs. V. March 5, 1875, performing craniotomy, cephalotripsy, and cranioclasm, in the presence of a number of professional friends. Mrs. V. has a Kyphotic pelvis. The case is recorded in my monograph on "What is the Best Treatment in Contracted Pelves." *Transactions of the New York Academy of Medicine*, 1876. The diagram, Fig. 1, represents the deformity of Mrs. V.'s pelvis. The deformity exists principally in the inferior strait. The diameters in the inferior strait are, between the tuber ischii, $1\frac{7}{8}$ inch; antero-posterior, from the coccyx to the pubes, $2\frac{1}{4}$ inches, the same as in the celebrated pelvis of Lange. Through this diminished pelvic space, a child weighing over eleven pounds, after being sacrificed, was delivered in one and a quarter hour. The patient recovered without any unfavourable symptom, and was walking about in two weeks. The labour existed for only a few hours, as in the last labour, previous to the commencement of her delivery. The os uteri was only opened to the size of a five-cent piece, seven-eighths of an inch, when the operation commenced. Mrs. Vallentine is now twenty-seven years of age, married seven years. Good constitution and strong will. The deformity was produced when she was going down stairs, by tumbling on her back, when she was nearly three years of age. Her height is four feet four and a half inches. The wood-cut, Fig. 2, gives a good illustration of the hump-back in the dorso-sacral region. No argument could change her mind respecting any kind of operation I might select; she wished a living child.

Fig. 2.



If it will not be considered as irrelevant at this time, but to show her determination and will and nerve, just as she was going to step on the table she handed me a small slip of paper, on which was written, "Doctor, I have no more change." January, 1880. I invited my colleagues of the Maternity Hospital, Drs. Lusk, Pallen, Gillette, and Mundé, to examine her at my residence. After the examination they thought it a favourable case for operation, and for laparo-elytrotomy. My own views were not decided at that time, whether I should select gastro-hysterectomy or laparo-elytrotomy.

From the favourable report of Dr. S. Possi respecting the operation of M. Pean, whom I saw operate in 1873, for fibroid tumour of the uterus, I learned that he had saved 17 out of 24 cases from 1869 to 1875. Later still I read the reports of the uncommonly successful cases of Dr. Thomas Savage, of Manchester, in 1878 and 1879, saving 5 out of 6, when the pedicle was dropped inside the pelvis; and the case of Dr. Gillette, successful to the mother, operated upon by laparo-elytrotomy, published in the *American Journal of Obstetrics*, January, 1880. Dr. G. considered "that for the operation the armamentarium of the obstetrician must be increased beyond his scalpel, sound, ligatures, and blunt hook, independent of version, the forceps, perforator, cephalotribe, and cranioclast," which were all used in his case. All these facts induced me to adopt the recent modification by Porro, of the Cæsarean section, as giving my patient, as well as the child, a more favourable chance for living.

I waived all consideration of any more danger from the operation than from the operations for fibroid tumours of the uterus, and the removal of the uterus, or for any of the other abdominal operations for various diseases or circumstances. But, still further, I considered what would be the pedicle of the uterus, the isthmus or intermediate part which exists between the body of the uterus and the cervix proper, as being more eligible for an operation for the extirpation of the uterus, at the full term of pregnancy, than in the non-pregnant state of the uterine structure, consequent on the physiological changes incident to pregnancy.

There are two modifications presented for acceptance to the profession to which I propose offering another, the one I performed.

1st. The Porro method—

1. Abdominal incision.
2. Opening the uterus, delivering child and placenta.
3. Ligating the uterus by the serre-nœud and removing it.
4. Securing pedicle by clamp to the abdominal wound.
5. Drainage tubes through Douglas's space.

2d. Müller, of Berne:—

1. Abdominal incision of seven and a half to eight inches.
2. Turning out the uterus.
3. Ligating it by the serre-nœud or écraseur.

4. Opening the uterus and delivering child and placenta.
5. Securing pedicle or stump to the abdominal wound.
6. Drainage tubes through Douglas's space.

3d. Taylor, of New York :—

1. Abdominal incision, four and a half to five inches.
2. Opening the uterus and delivering child only.
3. Ligating the pedicle with strong whip-cord or fish-line, as a temporary ligature.
4. Cobbler stitch one inch below for permanent ligature.
5. Removing uterus with placenta by scissors or scalpel.
6. Dropping pedicle in the pelvic cavity ; no drainage tubes.

It was my intention to have operated a few days previously, so that I could avail myself of the daylight. Mrs. V., however, on the evening of the 7th April, had incipient uterine pains. Early on the morning of the 8th labor had commenced. Pains at intervals of three-quarters of an hour. No dilatation of the cervix uteri. Cephalic presentation. Auscultation gave no evidence of the placenta being over the anterior part of the uterus, but it was recognized in the right lateral region of the uterus. 3 P. M. was selected as the time for the operation.

At 2½ P. M. pains every 20 minutes. Vaginal examination as before, and not the slightest dilatation of the cervix. Bowels had been moved, and the bladder evacuated.

At 3 P. M. Present Drs. Lusk, T. Burchart, H. Deblois, J. M. Hills, C. Cleaveland, F. Dennis, F. A. Burrall, C. A. Leale, W. Wells, of New Rochelle, Gillette, Mundé, and several others who came in later. The Listerean method was adopted, not only in the dressing, but the spray was used before, during, and after the operation. All the instruments, sponges, ligatures were carbolized.

The line of incision was through the linea alba. The abdominal structures were very thin. There was no hemorrhage, and the length of incision was four and a half to five inches. The anterior part of the uterus at once came into view, presenting a very vascular appearance, of a deep purple colour. The uterine sinuses were noticed coursing through its structure, large and full, and evidently betokened that a part of the placenta was lying underneath in the line of incision. Free bleeding followed the first gentle touch of the knife in the peritoneum of the uterus. The incision was made through the muscular structure, which was not more than one-third of an inch thick, and one inch long. The finger introduced recognized at once the placenta. The uterus was then quickly divided by the scissors up to the fundus, and downwards to within one and a half inch of the bladder. The hand was immediately carried through the partial placental attachment, the right groin of the child seized and safely delivered, and the child—a large one—cried instantly. The cord was tied by Dr. Dennis. Dr. Lusk was requested to elevate the uterus and tilt it forwards, while I cast a strong fish line around the base of the body of the uterus, and tied it as a temporary ligature three-quarters to one inch below the muscular structure of the body. The placenta was allowed to remain in utero. Immediately a double carbolized, strong Chinese silk ligature was passed an inch below the upper ligature with the strong curved needle I am in the habit of using in cases of lacerated perineum. The ligature was then tied very tight, and, as I thought, made secure enough. I had decided, previously to operating, to use the cobbler stitch, but the pedicle appearing so much smaller than I expected, I rested confident at the time on its availability, allowing even for some retraction to occur. I was, however, mistaken; after the retraction, the spermatic artery on the left side I found was bleeding, as well as the utero-ovarian artery running through the broad ligament. In a short time the cobbler's suture was inserted through the superior part of the broad ligament, as well as through the pedicle of the uterus, and the hemorrhage was arrested at once. No blood or liquor amnii escaped into the pelvic cavity, and it was left perfectly clean and dry. The abdominal wound was closed by carbolized silk sutures and dressed *a la Lister*.

The hemorrhage when the uterus was first incised, as it was very vascular, welled up quite freely, and to some may have appeared considerable, but it bore no comparison to the excessive and gushing stream in her first confinement, after the placenta had been cast off. Dr. Dennis, who carefully watched the pulse, informed me that at the close of the operation her pulse was as favourable as could be expected after the quick delivery of the child as well as the removal of the uterus, although it was considered as full during the operation. The shock, if there was any, would be attributed to this circumstance.

The time of operation was, as recorded by Dr. W. Wells, of New Rochelle: First incision at 3.20 P. M. Uterus opened at 3.25 P. M.—5 minutes. Child delivered at 3.27 P. M.—7 minutes. And uterus ligated and removed at 3.30 P. M.—10 minutes for operation. Finished operation entirely at 4.20 P. M.—1 hour.

Two hours afterwards the record was, pulse, 120; respiration, 30; temperature, 99¾°. At 10 P. M., pulse, 112; respiration, 26; temp., 99¾°. At 10 P. M., second night, pulse, 108; resp., 22; temp., 100¼°. It is not necessary to continue this minute detail, which was regularly kept until the sixth day. Only on the fifth day the temperature was 101¼°; pulse, 99; resp., 18.

The treatment was chiefly milk and lime water, in small quantities, for four or five days; hypodermic injection of Maj. sol. morph. five drops, according to circumstances. She generally slept very well and naturally, and every morning, when asked how she felt, responded, "Very well—splendid; I want something to eat." As the kidneys were acting very freely, the urine was drawn every three or four hours, unless she was asleep. The object in evacuating the bladder so often was to prevent its becoming so distended as, by stretching of its peritoneal covering, to drag upon the pedicle. On the sixth day the abdominal sutures were removed, and everything presented a favourable aspect. A few hours afterwards I recognized that the lower part of the external wound was not perfectly closed for one and a half inch. Two sutures were introduced, and the wound was completely closed by the 30th of April.

On the seventeenth day phlegmasia dolens commenced in the calf of the right leg, and on the twenty-first day it was beginning to subside. It was a mild attack, but on that day the left leg showed slight symptoms. Both limbs had materially improved by the treatment on the 2d of May, so as to exclude any danger from the disease itself. There was no fever, no increase of pulse or temperature during the duration of the phlegmasia, nor at any time after the operation. The treatment was ammon. carb. and tinct. ferri mur. Limbs swathed in soft flannel. She had been taking for some time iron and quinia. She improved so much from the phlegmasia dolens, and as the wound was perfectly healed, and no other symptom existing to claim attention, patient feeling remarkably well, as she herself said, except the limb, that on Sunday, May 2, I was considering about dismissing her, and only visiting her occasionally. She expressed a strong desire to get up and be moved on to the couch. I learned that she had previously, on the 15th, been up for a short time. I insisted very decidedly that she was not to rise or move herself about the bed, informing her of the great danger now that she was convalescing from the phlegmasia, greater than when it commenced. I did not visit her on Monday. That morning, while her husband was absent, she was lifted from her bed by the nurse, whom she had changed, and by her own assistance she got up, and sat in the rocking-chair for some time. Her husband returned home at 4 P. M., at which time she had slight vomiting, was faint, restless, and had some dyspnœa. I was sent for at 4.30 P. M., visited her at 5.15, and at once recognized that my patient had cardiac thrombosis, and had but a short time to live. Her face was mottled; lips blue, nails, fingers, and toes the same; cold hands and feet; almost pulseless; and dyspnœa. She was conscious, and informed her husband and myself that she was dying. I remained one hour, and she died at 7.30 P. M., three hours from the commencement of the attack of embolon, and twenty-six days after operation.

I regret this denouement, but no case could present a more clear exposition of disobedience to the advice of a physician, and the penalty was death. This is the third instance of embolism I have seen in five or six weeks. One of my patients died of embolism of the pulmonary artery five weeks after confinement. In two cases, some few years since, both of my patients being self-willed, and thinking they were perfectly well, contrary to the advice given and urged not to move the limbs, died in twenty minutes. Mrs. V.'s sudden death, therefore, though it may have an indirect bearing on the case, cannot militate against the exceedingly favourable result of the operation, for there was not the least untoward or unfavourable symptom occurring during the whole convalescence, everything was so perfectly natural. The attack of phlegmasia dolens was a mild one, though fatal in its issue from disobedience.

The time for the performance of Porro's method is from thirty to forty-five minutes or one hour. Müller's operation requires from one and a half to two hours, as in Liztman's case.

An objection has been entertained against this method, that it deprives the child of its natural supply of blood, and it has to be resuscitated after its removal from the uterus. The reasons I entertained for not resorting to the serre-nœud of Cintrat, or any of the different écraseurs, although I had prepared myself with them in case I should require their assistance, as well as for not using the clamp, and having the pedicle attached to the abdominal wound, were the following:—

Dr. Wasseige, of Liege, Brussels, in the report of his second case, says: "A chain écraseur was applied to constrict the cervix, but the tissues being so very friable an artery was opened, and before it was secured there was a serious loss of blood." In Dr. Coggi's case: "The pedicle or stump had formed no adhesion with the abdominal wound, which was five and a half inches long, and was in part retracted within the abdominal cavity; a portion of the inferior angle of the wound being retained by a fragment of uterine tissue held in the handle of the serre-nœud. The autopsy showed a retraction into the pelvic cavity by a failure of union with the parietes, and that this was interfered with by the involuntary movements produced by the serre-nœud." In Prof. Chiara's first case: "In consequence of the effect of vomiting, the pedicle was drawn into the abdominal cavity, and a knuckle of bowel forced out. This gave a severe shock to the system, from which she did not rally. The patient was in good health at time of labour." In one of Blundell's experiments, the fourth, the rabbit died in consequence of the ligatures slipping from their places, which were in contact with the abdominal incision internally. But independent of these citations, and others might be made, I was influenced by the anatomical views I entertain respecting that part of the uterus which intervenes or exists between the muscular structure of the body of the uterus and the cervix uteri proper—the isthmus, a structure which is entirely different from the body, narrower and slender, yet having space sufficient, consequent on its capability of being stretched or lengthened, to admit of its being ligated and divided between the ligatures, and to drop the pedicle into the pelvic cavity, instead of having it attached to the abdominal wound, as is so frequently done in the case of the ovarian pedicle. There will and must be consequently less motion or disturbance given to the cervix uteri, from its central position in the pelvis, and it will avoid its being twisted on its own axis. If the pedicle is short it must inevitably drag upon its attachment or union to the abdomen, as we have seen in the cases referred to. The pedicle will necessarily be longer in some instances than others; after the union has become complete, with the external wound, it may in time become, if it was short, amply long enough by its stretching, as it was in Porro's case, to allow of free motion.

On examination of a case after several months it was found that it had become *one* inch long, so that the woman could run, walk, and jump without any abdominal pain. Now, neither the muscular structure nor the glandular cervix admit of such lengthening or stretching. As a further corroborative proof as to the part stretching, it has been demonstrated in the unimpregnated uterus, and after many months after delivery in a non-involution of that organ, and in some cases of procidentia uteri.

Let us examine now the illustration (Fig. 3) of the specimen of the ablated uterus immediately after its removal from Mrs. V. and the delivery of the child. It exhibited anatomical as well as physiological points of much value and considerable interest. I was not prepared, however, to witness as clear and decided demonstrations respecting the three different kinds of structure belonging to that organ when in the pregnant state and when at the full term of pregnancy.

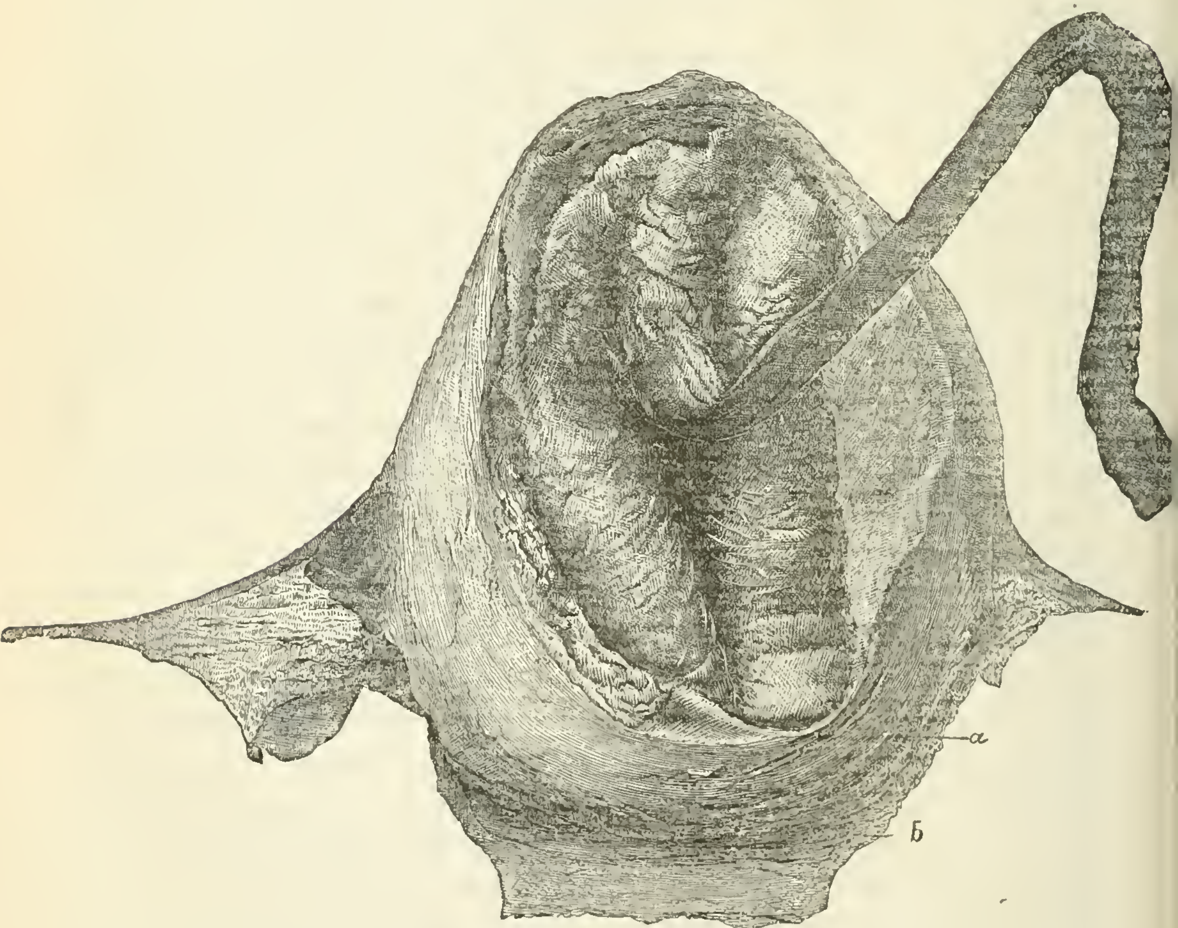
The specimen shows:—

1. The firm and true muscular element belonging to the body of the uterus solely, clearly, and distinctly.

2. The fibro-serous element existing between where the true muscular structure terminates and the cervix uteri, the isthmus or intermediate part, as this is the part which is constricted or ligated, and where extirpation is made, and may be two to two and a half inches long, and not the muscular structure; nor

3. The glandular structure, the cervix proper, which is left in the pelvis. The cervix was not dilated in the least.

Fig. 3.



a, body of uterus ; *b*, pedicle.
Length of muscular stump, 9½ in. ; breadth, 5½ in. ; length of pedicle ¾ in. ; breadth, 1¾ in.

No living specimen could demonstrate more positively the views which I have held and advocated for so many years, and it proves how erroneous the opinions and views of some obstetricians are, as well as are the late opinions of Bandl, of Vienna, respecting this intervening or intermediate portion of the uterus. Some of the operators have stated that it is the cervix uteri which is constricted, but that part remains after ablation, and is intact if the operation is performed early and the cervix has undergone no expansion.

With this modification of the Cæsarean section the operation can be taken advantage of before or at the commencement of labour. The muscular structure will then have suffered no change from continued contraction. By the removal of the uterus it sets aside the fear that metritis or metro-peritonitis will take place. As there is no uterus, the blood and lochia are excluded from creating any peritonitis or septicæmia arising from their presence. Prof. Spath has informed us that it has aided, if not cured, his patient with osteo-malacia. Hemorrhage need not be feared.

Shock to the nervous system is incident to all capital operations, and I do not think there is or will be more to be feared from the removal of the uterus than from a large fibroid, or fibro-cystic, or any abdominal tumour.

Syncope, for various reasons consequent on any capital operation on the abdomen, may happen in the most favourable cases, as is witnessed sometimes in natural and easy cases of labor. I have witnessed two cases of syncope in one day in quick but short and sharp deliveries in delicate persons; the patients were supposed to be dying or dead.

I erred in the manner of ligating the pedicle, as my judgment was overruled by the appearance of the smallness and thinness of the pedicle which I had to deal with, as well as from its size, its structure and its breadth, as the specimen shows, not being more than one and three-quarters inch in diameter. I should have applied the cobbler's stitch or suture as I originally intended, and not rested secure on the double ligature, and I do not think there would then have been any retraction of the pedicle from the ligature, and the arteries, the spermatic and utero-ovarian, would not have become exposed so as to demand any further constriction. I have always attached considerable value to this suture under various surgical necessities demanding its application over the ordinary form of suture, since I first used it in 1864, and presented it for acceptance to the medical profession in my monograph on procidentia uteri—*Bellevue Hospital Reports*, 1869. Dr. Emmet adopted it in several of his ovariotomy cases, and by the number of times he has resorted to it acknowledges its value.

This is the first instance in this country of the avowed intention, after the Cæsarean section, of extirpating the uterus. It was, so far as the operation is concerned, perfectly successful, as it is generally thought that, if the woman is doing well on the sixth or eighth day, she is almost certain to recover. The phlegmasia dolens which occurred on the seventeenth day, and was slight, was in a great measure recovered from. The death of the patient was caused by her own imprudence in rising from her bed contrary to positive and emphatic advice, especially at the time of recovery from the phlegmasia, and not by anything relating to the operation. Why should the case not, therefore, be considered among the saved, after twenty-six days from the operation?

The method I adopted differed in some respects from the methods of the Continental operators. The unique specimens illustrate distinctly the great advantage, I believe, of this modification. I am therefore impressed with the belief that it will be far preferable, for the reason advanced, and the anatomical view I have presented, to treat the pedicle as I did, and not resort to the clamp and drainage-tubes. In Briesky's case the cervix, as he states, remained open for forty days, forming a fistula. Septicæmia may therefore evidently occur from the imperfectly closed vessels of the pedicle.

The operation of removing the uterus is, from the standpoints I have taken, simple and easy; in it there is as much of a pedicle to ligate and remove as in an operation for ovarian tumour, and it is as justifiable as the removal of any ovarian tumour. The pedicle is longer in some instances than in others, and is modified in structure according to the nature of the constitution of the female at the time of operation, thicker or thinner, denser or more friable. As to the ablation of the uterus, unsexing the woman, it does no more than the Battey operation for the removal of the ovaries in the unimpregnated state. The future beneficial result, nevertheless, is to the woman of incalculable advantage and benefit. It claims an interest in her behalf in not allowing her to have any more progeny. It abrogates her right, justly, and as I conceive morally it should. to undergo another capital operation. It is a boon to her, though she may not be aware of the loss of the womb. It is absolutely necessary in a social and political aspect; for women of that class who are deformed from disease, as is witnessed so often in Continental Europe, are not capable of giving that care and attention necessary for the sustenance of their children, who, as well as themselves, are more generally cast upon the public charities for support, and they virtually become therefore a lien on the finances of those charities. The operation may unsex the mothers so far as the loss of the uterine organs are involved, but it does not remove or extirpate the sensual enjoyment, as that remains as normal as ever. It is a moral obligation, I hold, therefore, of the highest duty to sacrifice that organ, as much so as it is held to be a high moral duty by some of the most eminent obstetricians, and none more so than by our celebrated Meigs, that the sacrificial act of the child should not be performed several times, and by some that not more than once in those cases of deformed pelves necessitating the performance of cranioclasm, but to relegate it to the performance of the Cæsarean section or the modification of that operation or laparo-elytrotomy.

A word or two as to why, in my own case, only one ovary was removed. This was owing to my not recognizing how much the uterus was leaning to the left side, and thus not being held in the central position, which prevented the left ovary from being included in the ligatures of the pedicle. One ovary remaining will not admit of the idea being entertained, which idea has been advanced, that pregnancy might occur again. To entertain such an opinion at the present enlightened age, can only be construed into a visionary hypothesis.

The success of the recent modification of the Cæsarean Section by Prof. Porro is truly remarkable and very great. Only four years have elapsed, and there have been forty-nine operations; and in eleven years fifty, including Storer's. It has certainly instituted an entirely new order of events respecting the Cæsarean section, considered as it is by some as one of the most dangerous of all abdominal operations on the female. It is, however, a very singular circumstance, under the present aspect of the Cæsarean section, as to what kind of operation to perform, simple or modified that Prof. Blundell says: "If the Cæsarean operation be performed on a rabbit in the ordinary way, it will generally be found, unless I am much mistaken, that the *animal perishes in consequence.*" With his four experiments and removal of the uterus, three were successful out of the four. The modification by Porro of the "old style," thus far has diminished the death-rate very much. As I stated above, Prof. Chiara has shown by his last report, which I have quoted, that out of 62 cases lately performed, as before the new departure, only 3 were saved; which is as 1 saved to 21 deaths. By the modification, it has been demonstrated, as shown by the latest record of Dr. Harris, that out of 50 operations there were 20 saved—1 to 2½; if the unfavourable cases are excluded nearly 75 per cent. This record on the human subject would seem to corroborate Blundell's experience on animals. Time will, I believe, prove it to be an immense advantage to the parturient woman suffering from these great deformities of the pelvis, and at this early day, only four years since the innovation, the prediction of Blundell has been verified, and his pronunciamento will be accepted as true, that it is "an eminent and valuable improvement in obstetrics."

ARTICLE IX.

THE RESULTS OF THE FIRST FIFTY CASES OF "CÆSAREAN OVARO-HYSTERECTOMY," 1869–1880. By ROBERT P. HARRIS, A.M., M.D., Philadelphia, Ex-President of the Philadelphia Obstetrical Society, etc.

AMONG the multiplicity of titles furnished me in letters and pamphlets from Europe, upon the Porro operation, I have seen no one as appropriate as the above, which is employed by Dr. Paolo Negri, of Milan. It is hardly just to Prof. Porro to call by his name all the forms of utero-ovarian ablation now practised as completive of the Cæsarean section. We are obliged to accept them all in estimating the mortality of the cases, but if we were to reject the experimental modifications we should find a better record for those strictly according to the design of the Pavian professor. One thing is certain—the associates of Dr. Porro have thus far done the most successful work. He was present, on February 25th, at the sixth operation in Santa Caterina Hospital of Milan, and must have been gratified afterward to learn that the woman had recovered, making four saved in order out of the six, and also saving the six children. Milan now numbers 7 operations, and Turin 5, with 6 recoveries out of the 12. The balance of Italy, with 11 operations, furnishes but 2 recoveries, one of them being the case of Dr. Porro. There are good reasons for an excess of mortality in the balance; but all the cases were not managed as those of Milan and Turin. If the carbolic spray and Lister dressing are essentials of success, then some of the failures may be attributed to the want of them.

My remarks are not now confined to Europe, as in my last paper,[1] but apply to the seven countries, including our own, in which the operation has been performed. There have been, in all, 30 operators; one has operated 5 times; three, 4 times; one, 3 times; five, twice; and twenty, once. As I have had letters and pamphlets concerning thirty-six of the operations sent to me, I feel that the statistics have been carefully sought out.

Of the fifty cases twelve have not yet been published, and several others have simply been announced, so that the results are known through the journals. Some of the reports that have been sent me in full are known but very imperfectly, in the locality where the cases occurred. It is but four years since Porro performed his own operation, and already it is a very difficult matter to obtain reports of all the cases. Cases have been held back, and were only obtainable by perseverance and pressure. As a correspondent remarked, "If we have so much difficulty in obtaining the records of a recently introduced operation, and one of so much interest, what faith can we have in the statistics of a past age?" Whoever collects the second fifty operations will find it no simple matter to avoid omissions.

In the last number of this Journal I gave a table of 36 cases; the 14 to be now added are credited as follows: to Prof. Horatio R. Storer, Boston, 1869, 1; Dr. Girolamo Previtali, Bergamo, Italy, 1878–79–80, 3; Dr. Just Lucas-Championnière, Paris, 1879, 2, 1880, 1, = 3; Prof. Gætano Valtorta, Venice, 1880, 1; Dr. Guiseppe Chiarleoni, Milan, 1880, 1; Dr. Luigi Mangiagalli, Milan, 1880, 1; Prof. Gustav Braun, Vienna, 1880, 1; Prof. Alessandro Cuzzi, Modena, 1880, 1; Dr. Hausner, Barmen, Germany, 1880, 1; and Prof. Isaac E. Taylor, April 8, 1880, New York, 1. The cases that recovered were one of Championnière's, one of Mangiagalli's, and the second of Gustav Braun's. Eleven of the children were delivered alive; two of Championnière's died on the third and thirteenth days respectively.

Dr. Previtali has promised to report his four operations in the *Annali di Ostetricia*, of Milan. All the women were rachitic, and died of exhaustion, the longest survival being only thirty-six hours; he saved two of the children. Previous to these operations he delivered nineteen cases by the old Cæsarean method, saving but two women, who were treated in the country. These, with the sixty-two of the same order obtained by letters from Milan, give eighty-one Cæsarean operations for Northern Italy, with only five recoveries.

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[1] American Journal of the Medical Sciences, April, 1880.

Dr. Championnière's cases were, in La Maternité, two; Cochin, one; and Necker, one; and all operated upon in two months. His four cases were all rachitic dwarfs, measuring in height from three feet, seven and a half inches, to four feet, three and a half inches. The two which recovered were operated upon at full term and before labour fairly set in, one having as yet no pains, and the other slight ones. The operations were strictly performed according to the method of Porro. These give La Maternité a record of three operations, with two recoveries; more saved than in a hundred years by the old Cæsarean section.

Prof. Valtorta, of Venice, lost both mother and child. Dr. Chiarleoni operated on a rachitic subject of twenty-nine, in Santa Corona Hospital, Milan, on Feb. 17, 1880. The woman died of hemorrhage on the fourth day; the child was saved.

By a letter from Vienna, received May 17th, I am happy to announce that the case of Gustav Braun terminated favourably, both as to mother and child. This credits the "Krankenhaus" with nine operations, saving five women and nine children. The woman in this last case was rachitic, making three cases of malacosteon to six of rickets; two of each class died.

Prof. Cuzzi, formerly of Milan, and now in the Medical School of Modena, operated on March 2, 1880, on a rachitic subject who unfortunately was suffering with nephritis. The operation was performed when the os was opened to one centimetre in diameter. The woman died of peritonitis on the fourth day; the child lived. Dr. Hausner lost both woman and child, the former of hemorrhage on the third day from rupture of the ligature, the cervix being enlarged from inflammation and causing it to give way. The child was lost by prolapsus of the cord.

The Russian cases referred to in my last paper were erroneously reported in Paris. Dr. Oscar Prévôt's case was made the foundation of a rumor which has grown to be two Porro operations with one recovery. As my authority is Dr. Prévôt himself, who has kindly sent me a record of his operation, I can speak authoritatively. He operated in a case of rupture of the uterus, ten hours after the accident, and removed both it and the ovaries. The woman died on the fifth day from frequent hemorrhages of the pedicle. There was no pelvic deformity. The rupture took place in labour under the excitement of drunkenness; the uterus was sound in tissue apparently. The case attributed by Dr. Pinard to Dr. X., of Moscow, has had no foundation. Dr. Prévôt's operation is the first and only one of its kind on record.

Case 50 will be found fully reported in the current number of this Journal by Prof. Taylor; I will, therefore, only refer to it as a modification of the method of Porro, the design of the Pavian Professor being to avoid having the uterine wound within the abdominal cavity, by securing the stump of the cervix in the lower commissure of the abdominal incision. There have been six instances in which the operation of Dr. Porro has been modified, and four of the women died. No one in Europe had yet ventured to drop in the pedicle after a Cæsarean ablation. Dr. Taylor tried the experiment, and I regret very much that his patient finally perished. In the twenty-seven deaths occurring after the operation in Europe, there is no case of phlegmasia dolens mentioned, and only one woman died as late as the tenth, and one other as late as the ninth day; the death on the ninth day was from peritonitis, and on the tenth from tetanus. Dr. Taylor, in my opinion, incurred an additional risk in his departure from the Porro plan. In my former paper I spoke of the dangers of this proposed modification, and of the probability of *phlebitis*, metritis, etc. I do not say that the plan of Dr. Taylor may not succeed, but I do not believe that it will be found as safe to operate in this way upon the pregnant as upon the unimpregnated uterus. The successes of Péan, of Paris, had much to do with influencing the mind of Porro, but they did not induce him to drop in the ligated cervix. His theory, and that of Dr. Blundell, were based upon their comparative experiments on rabbits, and this led him to remove the uterus as the centre of danger, and convert the wound into one virtually out of the body, to be dressed as such, and kept under observation in case of hemorrhage. I believe that Dr. Taylor's patient would, in all probability, have recovered if he had dressed the cervical stump in the abdominal wound, transfixing it with strong pins, as has been done by Chiara of Milan. We cannot compare the pedicle in ovariotomy with the tied cervix in a case like Dr. Taylor's, and argue, from the successes in dropping in the former, that doing the same in the latter should bring a like result. Phlegmasia dolens is a very rare sequel of ovariotomy; is there reason to believe that it will be equally so after ligating the cervix uteri? But this is not the only reason why the pedicle in Porro's operation should be dressed externally. There are dangers of septic peritonitis, which must be greater with a wounded surface to discharge within the peritoneal cavity than external to it. It is much to be regretted that Dr. Taylor's modification, according to our view, increases the risk, as there are points which would otherwise make it a valuable improvement. The operation performed by him has already reflected unfavourably upon the Porro Cæsarean section, which his was not, in a vital point. If we want success in Cæsarean ovaro-hysterectomy, we must follow the examples of Milan, Turin, Vienna, and Paris, where the operators have saved 14 out of 27, or $51\frac{23}{27}$ per cent.

Chronological Register of the 50 Operations.

1.	Storer.	Boston.	1869.	Woman	lost.	Child	dead.
2.	Porro.	Pavia.	1876.	"	saved.	"	alive.
3.	Inzani.	Parma.	1877.	"	lost.	"	"
4.	Hegar.	Freibourg, G.	"	"	"	"	"
5.	Previtali.	Bergamo, I.	"	"	"	"	dead.
6.	Späth.	Vienna.	"	"	saved.	"	alive.
7.	"	"	"	"	lost.	"	"
8.	C. Braun.	"	"	"	"	"	"
9.	Chiara.	Milan.	"	"	"	"	"
10.	Muller.	Berne.	1878.	"	saved.	"	dead.
11.	Wasseige.	Liége.	"	"	"	"	alive.
12.	Franzolini.	Udine, I.	"	"	lost.	"	2 "
13.	C. Braun.	Vienna.	"	"	saved.	"	"
14.	Chiara.	Milan.	"	"	lost.	"	"
15.	Tibone.	Turin.	"	"	"	"	"
16.	Litzmann.	Kiel, G.	"	"	"	"	"
17.	Breisky.	Prague.	"	"	saved.	"	"
18.	Wasseige.	Liége.	"	"	lost.	"	"
19.	Perolio.	Brescia.	"	"	saved.	"	"
20.	Riedinger.	Brünn, A.	"	"	"	"	"
21.	Fehling.	Stuttgart.	"	"	lost.	"	"
22.	Chiara.	Milan.	"	"	saved.	"	"
23.	G. Braun.	Vienna.	"	"	lost.	"	"
24.	Previtali.	Bergamo.	"	"	"	"	" ?[1]
25.	Tibone.	Turin.	1879.	"	saved.	"	"
26.	Fochier.	Lyons.	"	"	"	"	"
27.	Coggi.	Cremona, I.	"	"	lost.	"	"
28.	Tarnier.	Paris.	"	"	"	"	dead.
29.	Tibone.	Turin.	"	"	"	"	alive.
30.	Peyretti.	"	"	"	"	"	"
31.	Tarnier.	Paris.	"	"	saved.	"	dead.
32.	C. Braun.	Vienna.	"	"	"	"	alive.
33.	Previtali.	Bergamo.	"	"	lost.	"	dead. ?[1]
34.	Berruti.	Turin.	"	"	saved.	"	alive.
35.	C. Braun.	Vienna.	"	"	lost.	"	"
36.	Mangiagalli.	Milan.	"	"	saved.	"	"
37.	C. Braun.	Vienna.	"	"	"	"	"
38.	Chiara.	Milan.	"	"	"	"	"
39.	Championnière.	Paris.	"	"	"	"	"
40.	"	"	"	"	lost.	"	"
41.	"	"	"	"	saved.	"	"
42.	Hausner.	Barmen, G.	1880.	"	lost.	"	dead.
43.	Previtali.	Bergamo.	"	"	"	"	alive. ?[1]
44.	Championnière.	Paris.	"	"	"	"	"
45.	Valtorta.	Venice.	"	"	"	"	dead.
46.	Chiarleoni.	Milan.	"	"	"	"	alive.
47.	Mangiagalli.	"	"	"	saved.	"	"
48.	G. Braun.	Vienna.	"	"	"	"	"
49.	Cuzzi.	Modena.	"	"	lost.	"	"
50.	Taylor.	New York.	"	"	"	"	"

Annual Division of Cases.

1869.	Operations	1.	Women	saved	0.	Children	alive	0.
1876.	"	1.	"	"	1.	"	"	1.
1877.	"	7.	"	"	1.	"	"	6.
1878.	"	15.	"	"	7.	"	"	15.
1879.	"	17.	"	"	10.	"	"	14.
1880.	"	9.	"	"	2.	"	"	7.

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[1] Previtali saved two of the children in his last three operations, I cannot say in which cases.

General Summary.

Italy	23 Operations.	8 Women saved.	21 Children alive.
Austria . . .	11 "	7 " "	11 " "
France . . .	7 "	4 " "	5 " "
Germany . . .	4 "	0 " "	3 " "
United States . .	2 "	0 " "	1 " "
Belgium . . .	2 "	1 " "	2 " "
Switzerland . .	1 "	1 " "	0 " "
	50	21	43

Causes of dystocia.—Deformed pelvis from rickets, 34; from kyphoscoliosis, 2; kyphosis, 1; malacosteon, 6; infantile pelvis, 1; Pelvic tumours, 3; operation in extremis from anasarca and dyspnœa, 1; cause not yet ascertained, 2 = 50.

Causes of death.—Peritonitis, 6; septic peritonitis, 5; septicæmia, 3; tetanus, 1; exhaustion, 4; shock, 2; broncho-pulmonary œdema, 1; anæmia and peritonitis, 2; hyperpyrexia and delirium, 2; hemorrhage, 2; and cardiac thrombosis, 1 = 29.

Noted as dwarfs, 30; hospital cases, 47; private patients, 3; percentage of women saved, 42. Of the first 50 classic Cæsarean operations in the United States, 23 were favourable to the women, or 46 per cent.; children extracted alive, 27. Whole record of the United States, 112 operations, with 48 recoveries, or $42\frac{6}{7}$ per cent.

713 LOCUST ST., PHILADELPHIA, May 18, 1880.

ARTICLE X.

CONTRIBUTIONS TO THE STRUCTURE AND CLINICAL HISTORY OF THE MULTIPLE NEUROMA. FROM THE PATHOLOGICAL LABORATORY OF THE ALUMNI ASSOCIATION OF THE COLLEGE OF PHYSICIANS AND SURGEONS, NEW YORK CITY. By T. MITCHELL PRUDDEN, M.D., of New York.

THE tumours of the nerves are either single or multiple, and when multiple, may either be confined to a single nerve trunk, or be found in nearly all the spinal and cranial nerves, in the brain and spinal cord, and in the sympathetic. It is convenient to apply the general term, multiple neuroma, to those cases in which a greater or less number of tumours exist on more than one of the main nerve trunks or their branches.

Although somewhat artificial, this classification is convenient as expressing, in a general way at least, the distinction which seems to exist between what appears to be a local, and a more or less general lesion. The recorded cases of multiple neuroma are so few, their clinical history so obscure, and the anatomical lesion in many cases so marked and extensive, and present features of such surpassing interest alike to the physiologist, the pathologist, and the practitioner, that a description of every case in which the clinical history is known or new anatomical facts are elicited, seems in the highest degree desirable.

The purpose of this article is to record a new case of this rare disease, and to give a brief summary of the cases hitherto described.

For the following clinical history of the new case, the writer is indebted to the courtesy of Dr. Herbert W. Little, Resident Physician to the Presbyterian Hospital, New York City.

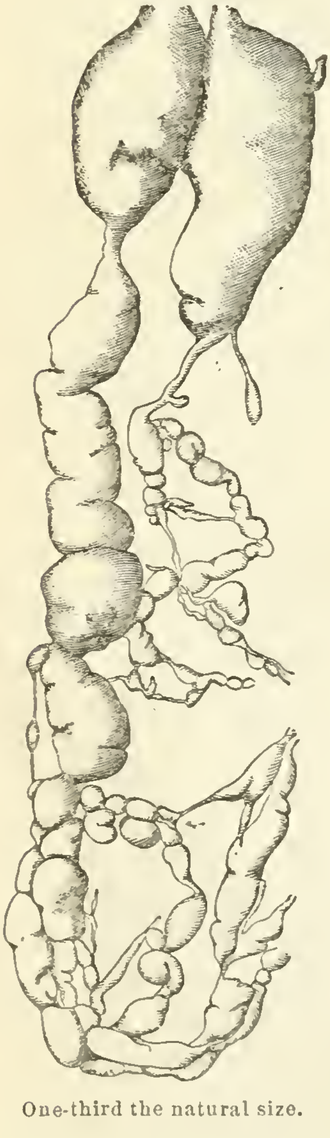
CASE I.—Maria D., female, age 25, single; lady's maid; Canada. Admitted to hospital Oct. 14, 1879. Family history negative. The uterine and associated functions have been normally performed; no venereal history. Seven years ago she had an attack of smallpox which lasted two months, and while convalescing she became partially paralyzed in both lower extremities, loosing sensation in both feet. The knees could be flexed with difficulty, and the thighs partly drawn up. Very little movement possible of the foot upon the leg. The upper extremities were unaffected, the arms and fingers being used for somewhat delicate manipulations, such as sewing and writing. She took strychnia for some time without benefit. Two months ago the use of electricity was commenced, and under it both feet recovered sensation, and the right leg recovered its power to a certain extent.

Before the use of electricity she had no pain, but since then she has experienced pain, sometimes quite intense and of increasing severity along the course of the sciatic nerves. On admission, patient was fairly well nourished, but presented a marked anæmic, even cachectic appearance. Motion in legs comparatively limited. The higher senses are intact, and she possesses average intelligence. General cutaneous sensibility normal except in the right foot. Numerous tumours were found in different parts of the body, especially in the right iliac region, axillæ, and neck, which were not painful on pressure, and had been first noticed during her convalescence from smallpox, since which time they had gradually enlarged, but had given her no inconvenience and attracted little attention. Under tonics and the continuous current she improved somewhat, but was still harassed, especially at night, by dull aching, or sometimes darting pains, along the course of both sciatics. There were no abnormalities in respiration or cardiac action, nor had she ever experienced any convulsive movements. Examination of the blood revealed considerable increase in the relative number of the white blood cells. On Nov. 1st, when apparently doing well, she was suddenly attacked with nausea and vomiting, then with diarrhœa, and died in four days.

The usual brain and visceral examination was made on the day following death, and the subject finally found its way into the anatomical department of the College of Physicians, where further dissections were made. The writer wishes here to express his indebtedness to Dr. N. P. Warner for a report of the condition of the cranial nerves, and to Drs. T. E. Satterthwaite, Pathologist, and W. H. Porter, Curator, to the Presbyterian Hospital, for a report of the autopsy and for some of the abdominal tumours.

Autopsy, forty hours after death. Rigor mortis pronounced; panniculus adiposus abundant; subcutaneous tissue slightly œdematous. A large tumour in the right iliac fossa was felt through the abdominal walls, and series of larger and smaller tumours or masses of tumours were distinctly to be felt on both sides of the neck, in the axillæ, and extending down the arms, and along the course of both sciatics down to the popliteal spaces. The heart presented no marked change. The lungs were slightly œdematous, and presented slight abnormalities in the form and number of the lobes. On the removal of the heart and lungs, a series of small whitish tumours was seen scattered at short intervals along either side of the spinal column; along the intercostal spaces the pleura was bulged out toward the thoracic cavity at irregular intervals, by numerous larger and smaller tumours lying between the ribs. The large tumour in the right iliac fossa, which weighed about two kilos, was embedded in, and attached to, the branches of the lumbar and sacral plexuses, and consisted of a congeries of larger and smaller tumours varying in size from a small pea to a goose egg, and the whole so firmly attached to the periosteum of the ilium that a portion of its superficial layers came off with the tumour on its removal. Within the mass of tumours a cyst was found containing about 150 c. c. of transparent straw-colored fluid. The whole mesentery was studded with small white tumours resembling enlarged lymphatic glands. On the anterior surface of the stomach was a white, sub-peritoneal tumour, about as large as a walnut. The stomach, intestines, liver, bladder, and generative organs presented no abnormalities. The kidneys were both deeply congested, and the capsule at some points slightly adherent. Microscopical examination showed a slight degree of parenchymatous inflammation. The brain and meninges were deeply congested, but otherwise presented nothing abnormal. The spinal cord was not examined at the autopsy, but the canal was opened later, and although the post-mortem changes were then too great to permit the formation of any opinion as to the ante-mortem condition of the cord itself, no tumours were found either upon the membranes or on the roots of the spinal nerves. The cauda equina was, unfortunately, not examined. One optic nerve presented a small fusiform enlargement just before piercing the sclerotic and numerous tumours of the same character were found on the supra- and infra-orbital, buccal, supra-maxillary, gustatory, and hypoglossal nerves, and also on the occipital, spinal accessory, and upper portion of the phrenics. Of all the cranial nerves, the lesion was most marked in the pneumogastrics, especially the right. The left pneumogastric in the cervical region was enlarged throughout and presented a series of distinct tumours; its average diameter being about 1 cm. The right pneumogastric (see Fig. 1) presented, near the point where the superior laryngeal is given off, a tumour 3.6 cm. in diameter and 6 cm. long. Between this point and the bifurcation of the trachea a series of tumours averaging about 2 cms. in diameter and 3 cm. in length, were closely set along the nerve, which was itself at no point less than 4 mm. in diameter. Below the tracheal bifurcation, the nerve as-

Fig. 1.

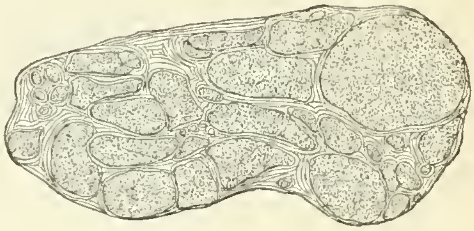


One-third the natural size.

sumed nearly its normal dimensions, but was for the most part involved, as were its œsophageal branches, in a series of fusiform tumours varying from 8 to 30 mm. in length and 4 to 16 mm. in thickness. The sympathetic of the right side was also the seat of excessive changes. (Fig. 1.) In the place of the superior cervical ganglion an oblong tumour was found 9 by 3.2 cm. In the deep cardiac plexus all the nerves were enlarged, as were the branches coming from the pneumogastric, and were thickly beset with irregular-shaped tumours from the size of a pin's head to that of a small Lima bean. The nerves of the extremities, which were fully examined only in the left leg and right arm, were thickened throughout almost their entire extent, and were the seat of the most extensive tumour formation. In the hand and foot alone the lesion was slight.

The tumours varied from the size of a pin's head to that of a hen's egg. The changes were more extensive in the lower than in the upper half of the body. Both sciatics, at their exit from the pelvis, presented themselves in the form of immense irregularly knobbed cords, the left, measuring at its upper portion 6 by 3 cm. in diameter, and diminishing but little in size down to the popliteal region. The right sciatic was somewhat larger. (Fig. 2.) At their upper portions, the external and internal popliteals were of nearly equal size, and measured about 4.5 by 3 cm. in diameter. All the nerves of the leg, both muscular and cutaneous, were thickened, and presented numerous ovoidal and fusiform tumours of varying size; the posterior tibial in the middle of the leg measured 2 by 1 cm. in diameter. Below the ankle-joint the nerves were but little thickened, and presented no distinct tumours. The left anterior crural, as it passed beneath Poupart's ligament, measured 3 by 1.5 cm. in diameter, and its muscular and cutaneous branches were thickly beset with tumours from the size of a millet seed to that of a large almond. On the main trunk of this nerve and its branches 276 distinct tumours were counted.

Fig. 2.



A transverse section of the right sciatic in the upper portion of the thigh. Natural size.

In many places, especially in the thighs, the subcutaneous tumours were so abundant as to form a dense mat, almost concealing the muscles beneath. On the left cervical plexus was a tumour as large as a hen's egg. All the nerves of the right arm as far down as the wrist were greatly changed, especially above the elbow. The right brachial plexus was formed of a mass of thick knobbed cords.

The whole number of distinct tumours counted in the right arm was 142. The whole number of tumours counted in the entire body, exclusive of the right leg below the middle of the thigh and the left arm, was 1182. All the muscles of the left leg between the knee and ankle were more or less yellow in colour, and this was most marked in those on the posterior aspect of the limb, where the gastrocnemius and soleus, although presenting their normal size and shape, were entirely converted into fat tissue. The right leg unfortunately was not examined.

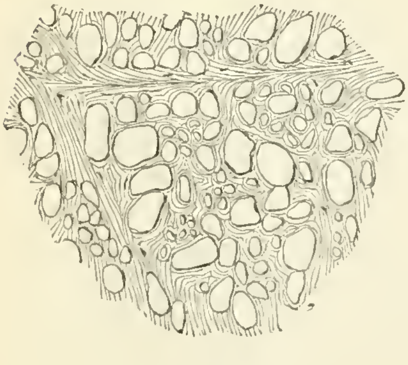
In some cases the tumours present themselves in the form of more or less symmetrical usually fusiform enlargements of the nerve. In other cases a portion of the nerve is seen passing, without enlargement, over the surface of the tumour to which it is often closely bound by connective tissue. The tumours are all inclosed in a distinct capsule, sometimes loose and thin, sometimes dense and thick, which, in many cases, seems to be a direct continuation of the lamellar sheath and perifascicular connective tissue.[1] In some cases they are arranged along the nerves at irregular intervals like beads upon a string, in others they are crowded closely together, giving the nerve the appearance of a cylinder with more or less well-defined constrictions at irregular intervals. In the larger and more complex nerve trunks, such as the sciatics, the entire cord is surrounded by a distinct sheath, within which are contained congeries of tumours attached to the different groups of nerves, each in turn being inclosed by distinct connective tissue membranes of varying thickness which serve as partitions between the different tumours and nerve cords. These tumours are intimately joined by oblique and transverse nerve fascicles which running from one to another weave the whole together into a tolerably compact mass.

In no case was a tumour found to which, by careful dissection, a nerve fibre could not be found joined. Not less varied is the consistency of the different tumours, and the appearances which they present macroscopically on section. The great majority of the smaller and medium-sized tumours are soft and distinctly gelatinous, but all intermediate forms are seen between these and those which possess the consistency and general characters of the fibromata. The softer gelatinous tumours are either transparent, grayish, and crossed here and there by bands of more consistent tissue; or, in many cases they are of a pale or deep red colour and exude on pressure a transparent, or turbid, or reddish fluid. Occasionally very thick walled bloodvessels may be seen upon the cut surfaces.

The microscopical examination showed that in those parts in which the lesion presented itself in the simplest form, that is, in the simply hypertrophied nerves, the change consists essentially in a diffuse sclerosis of the intra-fascicular connective tissue, the new formed tissue being for the most part dense and firm and furnished with few cells.

This thickened intra-fascicular connective tissue is more firmly joined to the neurilemma of the nerve fibres than it is under normal conditions, so that by carefully brushing thin sections of the nerves under water, the medullary sheaths and axis cylinders may be entirely removed leaving a more or less dense consistent reticulum behind. (Fig. 3.)

Fig. 3.



Portion of such a pencilled section.

In those cases in which the nerves present small but more or less distinctly circumscribed enlargements, the above described diffuse sclerosis exists either in the entire, or, which is more commonly the case, in circumscribed portions of the nerve; but in addition to this, there is in many cases, a more or less uniform involvement of a part or all of the inner layers of the lamellar sheath. This change in the lamellar sheath may consist in a growth inward from it into the nerve, of broad or narrow branching fascicles of connective tissue dividing the latter into irregular areas or chambers: or, what is frequently the case, the inner layers of the sheath at one or other side of the nerve or in its entire circumference become either simply thickened, or spread apart by an accumulation of cells of various sizes and shapes or by new formed connective tissue, so as to occupy a considerable portion of the diameter of the enlarged nerve and to form the greater part of the tissue constituting the tumour proper.

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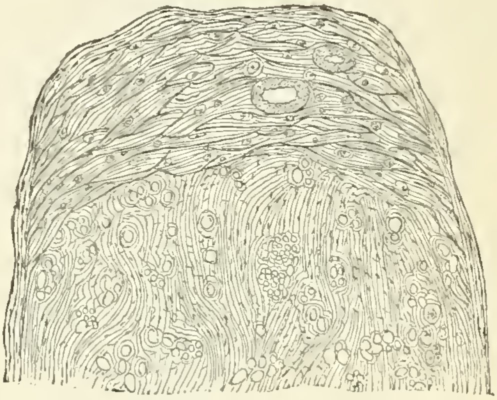
[1] To avoid misconceptions, the writer would state here that in the following anatomical descriptions of the nerves he uses the nomenclature employed and in part suggested by Ranvier in his Leçons sur l'Histologie du Système Nerveux, vol. i. p. 179 et seq.

In many cases, the lamellar sheath thus altered (see Fig. 4) is sharply outlined against the sclerosed nerve within, in others it passes without sharp demarcation into the tissue of the latter. In those cases in which a separation of the layers of the sheath occurs, the individual layers often retain their endothelial covering, as may be readily seen in transverse sections.

No attempt was made by counting, to determine whether the number of nerve fibres in the tumours was actually increased, but a series of measurements of a great number of fibres in the nerves leading to the tumours, and in the tumours themselves, showed that in a small proportion of cases only, the average diameter of the nerve fibres was diminished, while in the great majority of cases they preserved their normal diameters, and in some cases, particularly when the new formed tissue was soft and presented the characters of mucous tissue, many fibres were found which were considerably thicker than any found in the nerves leading to the tumour; a circumstance which seems to be of no little significance in view of the surprising absence of definite symptoms which is often seen it these cases of multiple neuroma.

Fig. 4.

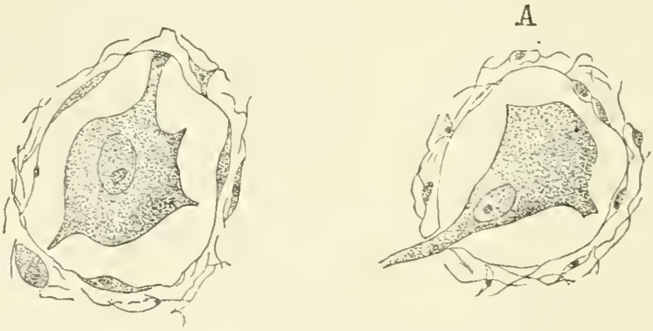


Part of a transverse section of such a small fusiform tumour, near the middle of which some of the nerve fibres are much compromised by the diffuse sclerosis. For the sake of clearness the medullary sheaths and axis cylinders have, except in one place, been left out of the drawing.

The larger tumours presented for the most part the structure of the fibromata or the myxomata, or more frequently a combination of the two. In some of them the lamellar sheath was intimately involved in the tumour mass, in others it was simply stretched around it. With one exception (see below), no evidence was found of any increase in the nerve elements proper within the tumours. In those tumours, which were distinctly myxomatous, very numerous narrow fibres, singly or in clusters, with oval nuclei at tolerably regular intervals along their sides, were seen curling about among the medullated nerve fibres and presented a very striking resemblance to amyelinic nerve fibres. The fact that after treatment with picric acid they could be broken up into delicate fibrillæ, and that in a few cases the nuclei were seen to be surrounded by extremely thin but distinct ovoidal or irregular-shaped cell bodies, convinced the writer that they were in reality however nothing else than fibrillar connective tissue of a peculiar form.

In one tumour, and in only one, a considerable number of ganglion cells was found. This tumour was formed upon one of the branches of the lumbar plexus, and was about 1 cm. in diameter and 1.5 cm. in length; it was symmetrical in shape, and the nerve entered it at either end. In a series of more than 50 sections from this tumour and the nerve on which it was formed, and in a large number of teased preparations of the same, except in the immediate vicinity of the ganglion cells, no amyelinic nerve fibres were found. These cells were all confined to a limited zone of the tumour about 2 mm. in thickness, and presented the usual diversity of form. The body was granular, the nucleus large and well defined, and usually contained one or more distinct nucleoli, and many of the cells contained larger and smaller masses of yellow or orange pigment. Each cell lay in a well-defined capsule, lined with flattened polygonal cells. The smaller ones had a diameter of .019 mm., the larger of .06 mm. The average diameter of all, taken from a large number of measurements, was .037 mm. According to Key and Retzius[1] the diameter of normal human sympathetic ganglion cells, ranges from .011 to .05 mm., the average being .025. (Fig. 5.)

Fig. 5.



Representation of two of these cells surrounded by their capsules; in A. a cell process is seen extending into the adjacent tissue.

The occurrence of ganglion cells in the multiple neuromata seems to be extremely rare; only two cases,[2] so far as the writer has been able to ascertain, having been recorded; and in one of these, the description of the cells was not so exact as to inspire much confidence in their identification. The occurrence of such cells would of course suggest the possibility of a connection of the tumour or its nerve with the sympathetic. But a most searching examination of the nerve and tumour above and below the point at which the cells were found, failed, as above stated, to give any evidence whatever that such was the case.

Finally, in regard to the nerve fibres in the tumours; in a few cases, especially in the dense fibroma, their diameter is diminished, as determined by measurement of the fibres in the tumour and in the nerves on which they are formed. In the majority of cases, however, the diameter is unchanged, except that sometimes a few fibres are seen here and there in the distinctly myxomatous tumours whose diameters considerably exceed those of any fibres in the corresponding nerve. It does not seem desirable to give the details of these measurements here; suffice it to say that the diameter of the fibres, as determined by several hundred measurements, ranged from .0024 to .0168 mm., while in some cases, within the tumours a few attained a diameter of .0216 mm. The nerve fibres pass through the tumours either in larger and smaller bundles, or run singly, being separated from one another by the new formed tissue. They pass for the most part, as determined by sections, parallel with the axis of the nerve, in straight lines or in broad sweeps; but in a few cases, they were found to pursue a most tortuous course, forming here and there large tangled knots in which the fibres run in all directions, twisting around one another and intertwining in the most irregular and intricate manner.

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[1] Key and Retzius, Studien. Heft ii., p. 136.

[2] Knoblauch, De Neuromate et gangliis veris, etc., 1843, p. 30. Czerny, Archiv für klin. Chirurgie, Bd. xvii. p. 357.

In many of the tumours the walls of the smaller arteries were greatly thickened, mainly by increase of tissue in the adventitial layers, and in a considerable proportion of the softer tumours the capillaries were excessively dilated, and in some cases distinctly pouched.

The microscopical examination of the above-mentioned fatty muscles of the leg showed the most exquisitely marked characters of progressive muscular atrophy, or, to use the nomenclature suggested by Friedreich, which more exactly expresses the character of the lesion, *Polymyositis chronica progressiva* with *accessory diffuse lipomatosis.* In the gastrocnemius where the lesion was most marked, almost no trace whatever of muscular tissue was left, the fat by which it had been replaced not even suggesting in its general arrangement the nature of the tissue whose place it occupied. This lesion of the muscles in our case is interesting not only as being the first case yet recorded in which multiple neuroma was complicated by this disease of the muscles, but also, on the other hand, as adding another to the diseases of the nerves which may possibly stand in etiological relations to this form of muscular disease.

In three of the cases analyzed below, "fatty degeneration" of certain groups of muscles was indeed recorded, but without a sufficiently detailed description to enable us to classify them definitely with the case in hand.[1]

If we limit the term, multiple neuroma, to those cases in which several nerve tumours are found on more than one main trunk or its branches, there are, so far as the writer has been able to discover, only forty cases yet recorded, exclusive of the one above described.

Although the extent of the lesion varies greatly in the different cases, the morphological characters are essentially the same in most of them, so far as the recorded descriptions permit us to decide. It seems to consist essentially in an increase in the connective tissue elements of both sympathetic and cerebro-spinal nerves, either in the form of a diffuse or circumscribed growth, giving now a simple thickening of the nerves, and again larger or smaller circumscribed tumours involving either the whole or only a part of the nerve. The nerve elements proper may or may not be involved, and when they are, the observed changes seem in most cases to be secondary to the connective tissue's new formation. In a few cases, however, it would seem that a not inconsiderable portion of the tumours consist of new-formed amyelinic nerve fibres. These tumours are liable to have from the outset or to assume myxomatous or sarcomatous characters, and in the latter case the possibility arises of their becoming malignant by metastasis. Tumours, although of a less well-defined structure, may also occur in the brain. When, however, we consider the symptoms which these tolerably well-defined changes produce, we find a diversity so extreme that, when we remember the small number of cases yet known, it is no wonder that in the great majority of them the true nature of the disease was first revealed after the subject had been brought upon the dissecting table.

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[1] The preparations of most of the above described tumours and nerves are deposited in the museum of the College of Physicians and Surgeons, New York City. Certain of these with an abstract of the case were presented before the Pathological Society of New York, at its session of Jan. 28, 1880, by Dr. T. E. Satterthwaite.

CASES II. and III.—The earliest recorded cases of this form of multiple neuroma are those of Monteggia[1] and Descot,[2] in which the entire nervous system presented numerous tumours, but of which no clinical history is preserved.

CASE IV.—In 1818, Schiffner[3] described the case of Florian S., aged 34, a cretin, small in stature, and never able to use intelligible language. Up to seven years of age he was unable to walk. At this time, without apparent cause, he was attacked with violent convulsions, which continued with little intermission for three days, after which by slow degrees he recovered and became able to walk, but with an unsteady gait. He was weak and puny, unsociable, and passionate; slept much of the time, and when roused to eat gorged himself to such a degree that vomiting frequently ensued. The most trivial excitement induced convulsions. When thirty-four years of age, in a fit of anger, he was seized with apoplexy, which terminated fatally in a few days. The brain was normal; the cerebral nerves, with the exception of the optic and fifth, were softened. Tumours were found on the eighth pair and on the pharyngeal and laryngeal nerves, which were also enlarged. The cardiac and œsophageal plexuses were enlarged, and presented numerous tumours, some of them as large as a filbert. The nerves of the cervical and tracheal plexuses were similarly affected from their origin in the cord outward. Numerous tumours were found in the nerves of the upper and lower extremities. The nerves of the sympathetic were unaffected.

CASE V.—In 1822, Schiffner[4] published his second case.

E. S., a younger brother of the former case, and likewise a cretin, died at 33, having been for a long time previously paralyzed in the lower extremities. No lesion of the brain or cord was noted. Numerous small tumours were found on various branches of the fifth nerve, on the facial filaments of the portio dura of the seventh, on the glosso-pharyngeal and pneumogastrics. In the cervical region the branches which the latter nerve sends to the larynx, as well as those by which it communicates with the sympathetic, were considerably enlarged, while in the chest numerous tumours were found on the œsophageal and pulmonic plexuses. Tumours were also found on the occipital, spinal accessory, and cervical nerves, and on those of both the upper and lower extremities. The right superior cervical ganglion was as large as a medium-sized filbert, as was also the inferior ganglion upon the left side.

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[1] Monteggia, Institutione chirurgische, 1813, vol. ii. p. 195: quoted by Wood in Edinburgh Med. Chir. Trans., vol. iii. p. 345.

[2] Descot, Dissertation sur les affections locales des nerfs, Paris, 1822.

[3] Schiffner, Med. Jahrb. des Oestreich. Staats, Bd. IV. St. 4, p. 77.

[4] Ibid., Bd. VI. St. 4, p. 44.

Case VI.—In October, 1817,[1] a plasterer, thirty-nine years of age, unmarried, of fair muscular development, entered the hospital in Würzburg, having over the entire surface of the body down to the knees numerous painless movable tumours from the size of a hazel-nut to six or eight inches in diameter. These were congenital, and his father had suffered from the same evil.

Up to the summer of 1817, he had been in ordinarily good health. He now began to suffer from attacks of severe headache, which at first were not of long duration. They gradually increased in intensity and came periodically, mostly at night. They were preceded by a cold feeling along the spine, and followed by fever and sweating. During and aside from these attacks he suffered from nausea and bilious vomiting, and while they continued he was often very restless; the pupils were dilated, and sometimes double vision and strabismus occurred. The attacks continued to occur, greatly exhausting him, and he now became extremely weak and began to have pain in the knees and legs. A few days before his death he complained of numbness in the limbs which occurred periodically and interfered with movement. The headache diminished, but pain in the legs and loins increased, as did also his general weakness. He died quietly December 5, 1817.

The entire left half of the cerebellum was crowded back by the greatly swollen crus cerebelli; the right half of the cerebellum was regularly formed but crowded aside. The pons Varolii merged into the medulla and crura cerebri. No marked alteration in the cerebrum except a slight increase in the amount of ventricular fluids. The spinal cord and its membranes were normal except that several little fat? tumours were found within the canal. All the cerebro-spinal nerves were three or four times as thick as usual, and the smaller branches were beset with numerous tumours. The nerves of both upper and lower extremities, as soon as they emerged from the intervertebral foramina, presented themselves in the form of enormously swollen cords beset with tumours of varying size. The great sciatics at the upper portions were one and a-half inches in diameter. Some of the sympathetic ganglia were as large as a hazel-nut.

Case VII.—Barkow[2] relates the case of Johann W., 30, cattle driver, narrow-breasted, and of weak intellect. He had suffered, so far as could be judged from his unsatisfactory account of himself, from successive attacks of pleurisy. Two years before his admission to hospital in 1822, he noticed a small painless swelling in the right calf. During the summer of 1821 it grew rapidly larger and interfered with walking, and finally the leg in its largest part attained a circumference of over eighteen inches. The corresponding foot felt heavy and numb, but the tumour was painful on pressure only at one point on the inner side of the leg. He was now lost sight of for a time, but in January, 1824, he presented himself again with the tumour greatly increased in size, and in the last stages of consumption, and died on the following day. The large tumour of the calf at the time of death was three feet one inch in circumference, its surface was nodulated, and it contained several cysts. The lower portions of the sciatic and the upper portion of the peroneus and tibialis were enlarged. Both pneumogastrics and many of their branches were thickened and presented numerous small tumours. The pulmonic and œsophageal plexuses were studded with small tumours. The right phrenic was somewhat enlarged near the heart; the sympathetic was normal.

Case VIII.—Another Würzburg case occurring in Schönlein's clinic is described by Hasler.[3]

Barbara H., 20, single, admitted September 20, 1828. A few weeks before admission she fell into cold water, and traces her illness to that exposure. She soon began to have spasmodic pains, numbness, and formication in the arms; weakness followed, then extreme anæsthesia and paralysis, so that without support she could neither walk nor sit; the fingers became permanently flexed, and the neck muscles became so paralyzed that she could not hold the head upright; emaciation excessive. Later she experienced pain in the upper extremities and about the body and in the præcordia, and she had attacks of difficult breathing and palpitation. A tumour was discovered under the right sterno-cleido-mastoid muscle which patient had not noticed before. A marked improvement was noticed under the use of strychnia. The attacks of palpitation and oppressed breathing soon recurred, however, and she experienced suffocative paroxysms similar to those noticed in animals after section of the pneumogastrics. The last of these she survived only two days, dying February 25, 1829. In the last days her appetite was poor, and she had diarrhœa.

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[1] Heller, Virchow's Archiv, Bd. 44, p. 338. (This case is known as Hesselbach's case.)

[2] Barkow, Bemerkungen über d. Nerven Anschwellungen, 1829.

[3] Hasler, De neuromate—Turici, 1835.

Autopsy.—The tumour in the neck was formed by an enlargement of the superior cervical sympathetic ganglion, which measured three by two inches, was fibrous in texture, and had small nerves running over its surface. All the nerves joining the ganglion were notably enlarged, and presented several circumscribed tumours. The right pneumogastric was studded with small tumours, and several of considerable size were found within the spinal canal upon the roots of the cervical nerves.

CASE IX.—The next case, recounted by Knoblauch,[1] occurred in Bischoff's service in the Insane Asylum at Heidelberg, in 1840.

George A., an idiot from infancy, was slightly built, but of strong constitution and extremely indolent and passionate. He died at 38 years of age of pulmonary gangrene with pleurisy. No marked lesion was noticed in the brain or spinal cord. Two spheroidal tumours of the size of a mulberry were seen, one on either side, connected with the seventh nerves, just before their exit from the cerebral cavity. The third, fourth, sixth, and the three nerves of the eighth pair, as well as the hypoglossals and spinal accessory, all had small oval tumours at their roots. Most of the spinal nerves were considerably enlarged, and presented numerous larger and smaller tumours. The nerves and ganglia of the sympathetic were likewise unusually large. The cervical ganglia were nearly double their natural size. The semilunar ganglia each formed a tumour as large as a Spanish nut. The tumours presented the structure of fibroma, but some of them contained large, rather indefinitely described cells, which were believed to be ganglion cells.

In 1843, two very similar cases were treated in the hospital of the House of Industry in Dublin, and form the basis of the very excellent and finely illustrated monograph on the Neuroma by Mr. Smith,[2] of Dublin.

CASE X.—The first patient, John M'C., a cattle driver, who had been constantly exposed to the weather, by day and night, had been admitted to the hospital three years before, with a globular tumour about as large as a medium-sized cocoanut, on the right side of the neck, extending from the mastoid process to within a short distance of the sterno-clavicular articulation. The tumour was freely movable from side to side, but resisted attempts at longitudinal movements. It had existed for fifteen years, but had never been painful, and was now troublesome only in the inconvenience which its size occasioned. A small tumour, of the size of a walnut, was found under the tongue. The tumours were thought to be malignant, and the patient was discharged without operation.

In 1843, he was again admitted, complaining of severe pain in the left hip. A tumour about the size of a man's head was found on the posterior aspect of the left thigh, which had been growing for two years. His general health had greatly depreciated since his last admission; he was restless, without appetite, and sleepless, pulse frequent, respiration normal, no excess of perspiration, and no diarrhœa. He lingered for a few months, gradually wasting away, and died with hectic symptoms and without pain, but emaciated to the last degree. The tumour in the neck was no larger at the time of death than when he first came under observation three years before.

Autopsy.—In the right iliac fossa a tumour was found, three and a half inches long, and one inch in diameter, connected with the anterior crural nerve, several filaments of which were spread out over its surface. The branches of the lumbar plexus were enlarged, some of the cords being three-fourths of an inch in diameter, and its branches were studded with tumours of various sizes, from that of an almond down. The left lower extremity presented a similar condition. Large tumours were found connected with both sciatics, that on the right measuring five by three and a half inches, that on the left ten by eleven inches. More than 550 tumours were counted on the lower extremities. A similar condition was found in the upper extremities, numerous tumours being present, not only on the larger trunks, but on the minute branches also. Numerous small tumours, from the size of a hempseed to that of a walnut, were found on the lingual, and three or four small tumours on the phrenics in the vicinity of the pericardium. The intercostals on both sides were greatly enlarged, but presented few distinct tumours. No marked alteration was noticed in the brain or spinal cord or their membranes, nor did the enlargement of the nerves in any case extend within the spinal canal. The total number of tumours removed from the body was more than 800.

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[1] Knoblauch, De neuromate et gangliis accessoriis veris, p. 27, Frankfort, 1843.

[2] The Neuroma. Robert W. Smith, Dublin, 1849.

Microscopical examination showed the tumours to be fibromata, developed in some cases from the intra-fascicular connective tissue, in others, apparently from the lamellar sheath.

CASE XI.—Dr. Smith's second case, Michael L., age 32, farmer, was admitted a few weeks after the death of the last case, presenting the symptoms of gastro-enteritis. Patient had always been healthy until a year before admission, when he contracted a severe cold and suffered much from pain in the limbs. He became emaciated, and the functions of the digestive system began to be deranged. On examination, subcutaneous tumours of various sizes were found on different parts of the body. One of these, of the size of a swan's egg, was situated between the tuber ischii and the trochanter major of the left side, and pressure upon this caused a sensation of pain in the leg, and produced a temporary contraction in certain fascicles of the gluteus maximus muscle, throwing them into prominent relief. The appearance of this tumour was said to have been preceded for six months by a sensation of the trickling of cold water down the limb. Six months before admission he first noticed the tumour, when it had the size of a gooseberry. He had suffered no injury at that point. Some of the other tumours were painful when pressed upon. Sensation and temperature of the surface were normal. He had no pain along the spine, but complained of a sensation of trickling cold, proceeding from the angle of each scapula, meeting at the spine, and passing down the back, dividing again at the sacrum, to follow the course of each sciatic. Latterly, his sleep had been broken, he lost flesh, stomach was irritable, food being frequently ejected shortly after eating, skin hot and dry, pulse 106. He died ten days after admission.

Autopsy.—Body greatly emaciated. Over 200 small subcutaneous tumours were scattered over the front and sides of the chest and abdomen. A considerable number was also found on the back. The branches of the right sacral plexus were much enlarged, and connected with them and nearly filling the true pelvis, was a tumour six by five inches, which compressed the rectum and bladder and contained numerous cysts filled with an albuminous fluid. The right sciatic throughout the greater part of its course was one and a half to two inches in diameter, and was composed of an agglomeration of oval or elliptical tumours. Tumours of various sizes were found on all the nerves of the right lower extremity, the total number being over 450. On the left side neither the lumbar plexus nor its pelvic branches was abnormal. The sciatic of this side was three-fourths to one-half an inch in diameter, and on its posterior surface just below its exit from the pelvis was a tumour five by four inches in diameter. The other nerves of this leg were studded with tumours, the whole number being over 300. In both upper extremities more than 300 tumours of various sizes were found. The pneumogastrics commenced to enlarge shortly before entering the chest, and throughout the whole thoracic portion formed trunks of immense size. On the superior portion of the right pneumogastric, which about equalled a goose-quill in size, was a tumour three-fourths by two and a half inches in diameter. Sixty tumours were found on the pneumogastrics and their communicating branches. The phrenic nerves were nearly twice their natural size, and presented near the pericardium a series of oblong tumours, somewhat larger than a grain of wheat. The supra-orbital nerve was enlarged. Nothing abnormal was discovered in the brain or cord. The mucous membrane of the stomach presented the usual characters of chronic inflammation. More than 1400 tumours of the nerves were removed, and Dr. Smith thinks that if all were counted, the number would exceed 2000.

CASE XII.—Dr. Smith[1] mentions the case of an individual, then living, related to him by Dr. Henry Kennedy, which is probably to be classed with the disease we are considering. The patient, a gentleman, forty years of age, has had for sixteen years several small tumours on the legs and arms, which have never been in the slightest degree painful. They are hard and movable transversely but not longitudinally. They have gradually increased in number, there being now about 60 in all. As the new tumours appear, the patient is irritable, and experiences an ill-defined "peculiar" sensation in the part.

CASES XIII. and XIV.—At the sessions of the Academy of Sciences, in Paris, of April 3, 1843, Serres[2] described two cases of this disease. The first he had seen in 1829, the second shortly before his report. Both died of typhoid fever, and without any symptoms pointing to disease of the nerves. The anatomical changes were similar in both. Most of the cerebro-spinal nerves were thickened, and presented, all along their course, numerous ovoidal tumours of various sizes; these were most marked in the lumbar and sacral plexuses, in the great sciatics, and the pneumogastrics. In one case the sciatics were as large as an adult humerus and very nodular, while the pneumogastrics were twice the size of the normal sciatic, and beset with large tumours. Numerous tumours existed along the cords of the sympathetic, and many of the ganglia were greatly enlarged. In the case of 1829, more than 500 tumours were found along the nerves. In both cases the spinal cord was normal. The roots of the spinal nerves were, in most cases, normal, but a few of both the anterior and posterior were slightly enlarged. As soon, however, as the nerves had passed beyond the ganglia they became enlarged and presented tumours. In one case the intercostal grooves were considerably broader and deeper than normal for the lodgment of the greatly enlarged and nodular intercostal nerves.

CASE XV.—At the session of November 24, 1845, Serres[3] reported to the Academy another case observed by Maher and Payen.

The patient was a convict, twenty-six years of age. He had always been well, and was of a happy disposition. After his sentence, in March, 1845, he became sad and gloomy, his appetite failed, and he had an attack of diarrhœa which lasted fourteen days; he complained also of a sense of weariness in his legs on exertion and of stiffness of the knees. He recovered from his diarrhœa and appeared better, but, receiving at this time a mental shock, he relapsed, his strength diminished, he slept poorly, became apathetic and averse to exertion, and finally quite feeble; the diarrhœa returned, he rapidly emaciated, grew more and more despondent, and died with symptoms of typhoid fever. Muscular movements, although made with aversion, were at all times complete and regular, and there was no absence of general sensibility. He presented no sign of actual pain, and no symptoms were observed pointing to lesion of the nerves.

Autopsy.—Brain and spinal cord normal, with the exception of a slight injection of the pia mater cerebralis. Tumours were found in all the cerebral nerves except the auditory, olfactory, and pathetic. The pneumogastrics were enlarged throughout almost their entire course, and presented tumours of various sizes in all their branches. Some of the roots of the spinal nerves were slightly enlarged, but presented no distinct tumours. Beyond the ganglia, however, tumours of various sizes were found throughout their whole extent, in the trunk and extremities, except in the feet and hands, which were entirely free.

CASE XVI.—Gunsberg[4] describes the case of a man, who presented at first the symptoms of very intense general rheumatism with immobility of the members.

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[1] Smith, loc. cit.

[2] Serres, Comptes rendus de l'Académie des Sciences, vol. xvi. p. 643.

[3] Serres, Ibid., vol. xxi. p. 1171.

[4] Gunsberg, Ibid., vol. xvii. p. 982.

After several days of treatment, mobility was at first partially re-established, but difficulty of movement remained in the inferior extremities, and continued to augment during the following weeks until death, when there was complete immobility. In the last days he had incontinence of urine and feces. At the autopsy tumours were found on the third and fourth sacral nerves on both sides of the cauda equina. One tumour on the left side measured 1 by 1.5 cm. The structure was that of fibroma.

CASE XVII.—Serres presented the clinical history of still another case, then living, at the session of the Academy, in May, 1846.[1]

L., age 26, carpenter, had always been healthy; his antecedents were good, no venereal history. In April, 1845, after a day of hard work, and without premonitory symptoms, he became totally blind in the right eye, waking in the morning with vision lost and with ptosis palpebræ on the corresponding side. From this condition he had not recovered at the time of the report. In the same year he had an attack of pleurisy. In January, 1846, without premonition, while in the street, he suddenly felt a convulsive movement in the right thumb, accompanied by pain; the fingers of the same hand became flexed, the pain extended along the arm to the larynx, producing a sense of suffocation, and he was unable to cry out. These phenomena occurred within the space of one-half a minute, and he then lost consciousness. He soon recovered from this attack, but had another the same evening, which, however, was less severe; he had pain in the arm and flexure of the fingers, but did not lose consciousness. The next day he felt well, but the right arm was weak. Since this time he has had several more or less violent convulsive attacks similar to those described. He has become feeble and has considerable pain, especially in the arms and legs. Numerous hard spheroidal or ovoid tumours of various sizes were found in different parts of the body, some of them extremely painful on pressure, others quite insensitive. They are nearly symmetrical on the opposite sides of the body. His general health is fair, but he is emaciated; pulse and respiration normal; intelligence unimpaired.

CASE XVIII.—M. Morel-Lavallée[2] presented to the Surgical Society of Paris, at the session of April 18, 1849, a neuroma of the left median nerve, about the size of a turkey's egg, which had existed for a long time, with the following brief report. It had been painful for about four years, was somewhat movable, and had caused considerable weakness in the fingers of the corresponding hand. Some of the fibres ran over the surface of the tumour and entered it. All the cerebrospinal nerves presented ganglioniform enlargements of various sizes. Both pneumogastrics presented tumours as large as a walnut; there was, however, no disturbance of the respiratory or digestive functions. The brain and spinal cord, as well as the sympathetic, were normal; the patient died of cholera.

CASE XIX.—At the same session of the Society, M. Giraldes mentioned the case of a person dying in a Parisian hospital (of what disease he did not state), who, during life, gave no symptoms pointing to disease of the nerves. All the nerves, however, were found beset with tumours, those on the pneumogastrics being as large as two fingers. Some of the nerve fibres passed over the surface, others entered the tumours.

CASE XX.—Lebert,[3] in 1853, records a case related to him by Dr. Sangalli, of Milan. A female, thirty-five years of age, presenting gibbosity of the spine, began to be subject to epileptiform convulsions at twenty-eight years of age. On her admission to hospital, a tumour of the size of a fœtal head (?) was found in the right inguinal region. Two other tumours of the size of a lemon were situated superficially in the left scapular region. She experienced no pain, either in or about the tumours. She died suddenly.

Autopsy.—Cysticercus in brain. The scapular tumours were fibrous in texture; with nerve filaments passing over the surface or entering the tumours at the ends. The inguinal tumour extended into the pelvis, and was surrounded by a chaplet of smaller tumours. The nerves in the extremities were not examined.

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[1] Serres, Comptes rendus de l'Académie des Sciences, vol. xxii. p. 879.

[2] Morel-Lavallée, Bul. de la Soc. de Chirurgie, t. i. p. 225–6.

[3] Lebert, Rapport sur le travail de M. Houels, intitulé Du Nevrome, Mém. de la Soc. de Chirurgie de Paris, t. iii.

M. Houels,[1] in the same year, describes the following case, which was treated in Nélaton's clinic.

CASE XXI.—Adrien B., age 26, shoemaker, admitted March 27, 1851, for operation on a tumour in the right groin. Five months before entrance to hospital, he noticed, for the first time, a swelling as large as a pigeon's egg in this region. It caused him slight pain, especially during changes in the weather. Several tumours as large as a grain of wheat were found in the abdominal walls, others in various parts of the body. Most of them gave him no spontaneous pain, and but slight pain on pressure. They were not adherent to the skin. His general condition was good, though he was somewhat emaciated. Certain muscles, especially those of the forearm, were slightly contracted. General sensibility intact. On April 1st, the tumour in the groin was removed; the healing of the wound was slow, not being completed until July; and during this time the other tumours were observed to increase in size. The muscular contraction now became more pronounced; patient complained of pain, especially on changes in the weather. He became still more emaciated; appetite good, respiration normal. Contraction of muscles increased, and movements became slow and embarrassed. General sensibility intact, or seemed even to be a little exaggerated. Toward the end of September patient took finally to the bed; the pains became more acute; did not seem to be localized in the tumours themselves, but were most marked in the forearms and knees. The legs became flexed on the thighs, and finally flexion of the thighs on the body occurred. Passive movements of the legs were still possible, but acutely painful. Later, movements in the superior extremities became impossible, and pressure on the tumours extremely painful: general sensibility still preserved. The number of tumours had now considerably increased. Opium by the mouth and subcutaneously relieved his pain at first, but toward the end was of little avail. In the last days, appetite almost completely failed, diarrhœa came on, respiration became embarrassed, pain more and more acute, slight degree of opisthotonos. Still the general sensibility, and also taste, hearing, and smell, remained intact. A bedsore formed over the sacrum; spontaneous luxation at the left hip joint occurred. Death on December 16th.

Autopsy.—Brain and cord normal, also the viscera. The cranial nerves within the skull voluminous. On the cauda equina numerous small tumours (the largest of the size of a pea) were found along the nerves; on one trunk twenty were counted. With the exception of the olfactory and optic, all the cranial nerves presented tumours of various sizes. The ophthalmic and Gasserian ganglia were very voluminous. Both pneumogastrics above the stomach presented numerous tumours, but on arriving at this point became normal. All the nerves of the upper extremities were notably hypertrophied and, with the exception of those in the palmar regions, were beset with tumours; one of these on the median and another on the radial were as large as a hen's egg. The lumbar and sacral plexuses were greatly hypertrophied, and presented numerous tumours, as did the smaller nerves of the leg, with the exception of those in the foot. There was general hypertrophy of the main trunks of the sympathetic in their cervical and thoracic portions, but no circumscribed swellings; in the abdominal portion they were nearly normal. The great splanchnic was voluminous, and presented small circumscribed swellings. Semilunar ganglion and its plexuses normal. Mesenteric plexus presents a few small tumours, the largest of the size of a hazel-nut. Structure of the tumours fibromatous.

CASE XXII.—Kupferberg[2] describes the case of a man sixty years of age, in whom six years after fracture of the right leg and without any special local symptoms, numerous tumours were developed. They were most numerous on the broken leg, but were found in the other leg and in the perineum, also in the right infra-clavicular fossa and near the right acromion. At the autopsy numerous tumours were found within the spinal canal attached to the cords of the cauda equina. They existed on the muscular as well as the subcutaneous nerves.

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[1] Houels, Mémoire sur les Nevrome, Mem. de la Soc. de Chirurgie de Paris, p. 53, t. iii.

[2] Kupferberg, Beiträge zur Geschwulste im Verlaufe der Nerven. Mainz, 1854.

There was fatty degeneration of the muscles as well as of the nerve fibres. Structure of the tumours, fibroma and fibro-myxoma.

Case XXIII.—Follin[1] mentions briefly, and without a clinical history, a case in which there were innumerable tumours scattered over the nerves, each of the filaments of the sciatics presenting several distinct nodules.

Temoin,[2] in 1857, recorded the following case:—

Case XXIV.—Male, age 32, health good until fifteen years of age, when he remarked an insensitive tumour, of the size of a hazel-nut in the right submaxillary region, which seemed to be increasing in size. At this time he had violent toothache, which continued notwithstanding the extraction of several sound teeth. When sixteen or seventeen years old he observed tumours on the left arm, then on the left thigh, and on the fingers of the right hand, and finally in nearly all parts of the body. While small the tumours were not painful; when larger, pressure caused pain and momentary paralysis in the part. When twenty-four years old he had articular rheumatism, lasting five months. In his thirty-second year, considerably emaciated, he was admitted to hospital, and the tumours, which had not increased in size for some time, were most abundant on the breast, back, and arms. Pressure on some of those situated on the lateral walls of the chest, and on one about the size of a hen's egg, at the superior angle of the left scapula, caused pain and produced an uncomfortable sensation in the chest, and embarrassed respiration. The submaxillary tumour was spontaneously painful. There was no paralysis, no disturbance of function in the organs of sense, and his intelligence was intact. On the 7th of June, 1857, one of the tumours on the left radial was removed; a painful inflamed ulcer remained at the seat of operation, and the patient died on the 12th of July, of "purulent infection."

Autopsy.—Two metastatic abscesses in the liver. Brain, spinal cord, and cerebral nerves normal. The intercostal, as well as most of the other spinal nerves, especially toward their central end, were thickly beset with tumours. In the periphery the tumours were fewer in number. Both pneumogastrics, especially in the cervical region, presented a great number of tumours, many of them about the size of a hazel-nut; the pulmonic, cardiac, and visceral plexuses were free. A tumour was found on the cervical sympathetic. The tumours were fibroma, and the nerve fibres within them did not seem to be interrupted, but simply displaced by the new formation.

Case XXV.—Wilks[3] presented to the London Pathological Society, in Nov. 1858, specimens of neuroma from a woman twenty-five years of age, of dissolute habits, but with no definite syphilitic history, and who, while in hospital, presented no symptoms of disease of the nervous system, but was treated for and died of phthisis pulmonalis. Tumours of the nerves were accidentally discovered when the subject came to be used for anatomical purposes. The cranial nerves were not examined, except the vagi and phrenics, the former of which was somewhat affected. Tumours of the nerves of various sizes, the largest on the sciatic, being as large as a pigeon's egg, were found in all parts of the body, as well as diffuse indurations. They had the structure of fibroma.

Case XXVI.—The details of a case reported by Klob in the *Zeitschrift der Gesellschaft der Wiener Aertzte*, 1858, No. 13, p. 47, the writer has been unable to obtain.

Case XXVII.—Another case was presented to the London Pathological Society, in 1861, by T. Smith.[4] Twelve neuromata were removed after death from a woman between sixty and seventy years of age. They were found on the internal cutaneous and posterior interosseous nerves of the arm, and varied in size from No. 6 shot to a walnut; the larger ones having existed for more than forty years. Their structure was that of fibroma.

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[1] Follin, Traité élémentaire de Pathologie, 1861, vol. ii. p. 218.

[2] Temoin, Bul. de la Soc. anatomique, Dec. 1857.

[3] Wilks, Trans. Path. Soc., London, vol. x. p. 1.

[4] Smith, Ibid., vol. xii. p. 1.

CASE XXVIII.—The following is a summary of a case described by Heller,[1] in 1865. J. F., male, age 45, teacher. In 1847 he was treated in a hospital for periostitis calcis dextra. Later, ulcers appeared on the leg of the same side, which, without much pain, increased in size, and finally became so extensive and troublesome that amputation was advised. This patient refused, and, though with intervals of improvement, his condition became worse and worse, until finally, in December, 1865, unable to use the legs and hobbling on crutches, he entered the hospital with a purulent, stinking ulcer covering nearly the entire lower part of the right leg and foot, and with four toes gangrenous. On December 18 the leg was amputated in the upper third. When patient came out of the chloroform narcosis, the author noticed a remarkable indifference to the pain of dressing the stump, although attention had not been before called to any lack of sensibility in the part. He died of pneumonia two days after the operation.

Autopsy.—Faulty development of external genitals—cryptorchismus. Pneumonia of right side. Nothing abnormal in brain or upper portion of spinal cord. From the second lumbar, all the roots of the spinal nerves were enlarged, forming, partly within and partly without the spinal canal, a succession of thick, knobby, fusiform masses. A tumour of the size of a hazel-nut was found within the dura, on the third and fourth left lumbar nerves, and also a number of such tumours on the nerves of the cauda equina. No tumours were found in the upper half of the body. In both thighs there were numerous fusiform tumours, both subcutaneous and muscular; one lying beneath the left sartorius measured 4.5 by 10 cm. The muscles in the upper part of the body were normal, but those in the lower part, especially in the left leg, presented the most extensive fatty degeneration, having entirely lost their natural color, and being converted into pure yellow masses. A part of the sympathetic ganglia was enlarged, forming dense fusiform masses, some of them measuring 2 by 4 cm. The author thinks, that, in addition to the increase in connective tissue which made up the bulk of the tumours, there was an actual proliferation of nerve fibres.

Hitchcock[2] gave an account, in 1862, of three cases, all belonging to one family.

CASE XXIX.—Mrs. C., age 81. No family history of importance, her parents had no tumours of any kind; she is healthy, and her mental powers are unimpaired. When thirty years of age tumours began to appear beneath the skin in different parts of the body. They gradually increased in number, and some of them in size. They have never been painful, except from injury, and the color of the skin over them remains unchanged. They are now spread over the entire surface of the body, being most abundant in the neck, thorax, and arms. They vary in size from a pin's head to a walnut. Some of them are hard, others soft, and present various forms. She has had seven children, several of whom died early of acute diseases. Samuel and Elizabeth both have tumours like the mother.

CASE XXX.—Elizabeth C., age 54. Tumours began to appear at ten years of age. One in the clavicular region, as large as a hen's egg, was removed when she was twenty-one years of age. Another was also removed from the lip. She thinks the rest have grown more rapidly since these operations, and she now has several on different parts of the body.

CASE XXXI.—Samuel C., age 46. When twenty-five years of age he first noticed a small movable tumour just above the inner condyle of the humerus; this slowly increased in size for twenty years, being painful only on strong pressure. Two years ago it began to increase rapidly in size, and now, on pressure, or when the arm is violently used, the tumour is painful, or a numbness, or a prickling sensation, or acute pain extends down to the fingers. On admission to hospital, the tumour measured six and a half by three and a half inches. It was removed, being found attached to the ulnar nerve, some of whose fibres ran over its surface. The nerve was severed in the operation. Other subcutaneous tumours were noticed at the time of the operation. The wound healed well, leaving paralysis of the parts supplied by the severed nerve. Eight months after, another tumour appeared at the seat of operation, which was very painful, and increased rapidly in size, encircling the limb so that in one year the arm had a circumference of twenty inches. The other tumours had, in the mean time, increased in size and number. They were, for the most part, soft, some of them pedunculated, the largest of the size of a pea, and were chiefly found on the back, chest, and belly. A painful, cord-like mass was felt in the axilla, extending down toward the large tumour of the arm. Exarticulation at the shoulder-joint was now performed, and a dissection of the arm revealed numerous tumours along the nerves. The wound did not heal well, but continued unhealthy, raw, and bleeding. Patient lost flesh, and died from exhaustion seven months after the operation. No autopsy was made.

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[1] Heller, Virchow's Archiv, vol. xliv. p. 338.

[2] Hitchcock, Am. Jour. Med. Sciences, vol. xliii. p. 320.

CASE XXXII.—In Heusinger's case,[1] described in 1863, the lesion of the nerves was coexistent with tuberculosis. The patient, 23 years of age, a tailor, was weakly built but healthy in early youth, and mentally sound. Began to cough and emaciate a year before death. On admission, he was extremely weak, had severe cough, sweat profusely, and had diarrhœa. In the intercostal spaces, and over the entire surface of the body, especially along the course of the large vessels and nerves, tumours were found, from the size of a hemp-seed to that of a bean. They were not attached to the skin, but gave to the latter, in many parts, a beaded appearance. They had scarcely attracted his atttention, and had given him no annoyance. They were regarded as degenerated lymph glands and vessels, associated with his condition of general tuberculosis. He grew rapidly weaker, and died, with symptoms of pulmonary œdema, soon after admission, having had no local pain.

Autopsy.—Lungs infiltrated with gray and yellow tubercles, no large cavities. Brain normal; cord not examined. Tumours were found on several of the cerebral nerves soon after their emergence from the bony canals. One as large as a pigeon's egg was found on one of the hypoglossal nerves. Both pneumogastrics were as thick as the finger, as were some of the trunks of the brachial plexus. The great sciatics, on emerging from the pelvis were two centimetres in diameter. The mesenteric nerves were studded with tumours, and looked like strings of pearls. The lesion was especially marked in the sympathetic. The protocol says, "Right and left from the vertebral column lies on either side a cord as large as the thumb, pouched like a large intestine, and sending off beaded cords to the organs, heart, chest-wall, etc." Beneath the diaphragm the cords were also beaded with tumours, from the size of a hempseed to that of a hazel-nut. On microscopical examination, the nerves within the tumours, which were fibromata, seemed to be normal.

CASE XXXIII.—Lebouey[2] records a case, without clinical history, in which there was a most extensive formation of tumours. They presented the usual variety in form and size, and were found in various branches of the third and fifth pair, in the pneumogastrics, and their laryngeal, pulmonic, œsophageal, and cardiac plexuses. The phrenics presented numerous nodules before passing through the diaphragm. The intercostal nerves were greatly enlarged and nodulated. One of the tumours on the median measured three by four inches.

CASE XXXIV.—Another extremely interesting case is that of Sibley.[3] Patient aged 45, coach painter. Had always enjoyed good health until seven years before death, when he began to feel himself growing feeble, but he had no more definite symptoms until four years before death, when the use of the lower extremities became impaired, and by degrees he lost all power of movement. A sloughing sore appeared on the back, and, when admitted to the Middlesex Hospital, he had no power of movement in the muscles of the lower half of the body, and the legs were drawn up to the abdomen; they could be drawn down, but would again soon become flexed. He retained some power of movement in the upper extremities, being able to feed himself if the food was cut for him. Cutaneous sensibility was entirely lost in the lower extremities, but a certain amount of sensibility remained in the hands. Urine and feces passed involuntarily. A large tumour was evident near left elbow, and another below Poupart's ligament of the left side. Appetite good. There was at first some improvement in the sloughing sore on the back, but it soon became worse, and patient died one month after admission.

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[1] Heusinger, Virchow's Archiv, Bd. xxvii. p. 206.

[2] Leboucy, Des Nevromes, Paris, 1863.

[3] Sibley, Med. Chir. Transactions, vol. xlix. p. 39, 1866.

Autopsy.—Body well nourished. No lesions of thoracic or abdominal viscera. Brain and cranial nerves normal. In the spinal canal numerous tumours were found within the membranes connected with the roots of the nerves, being most abundant in the cervical and lumbar regions. In the cervical region several tumours were found, the largest having the size of a large walnut, and pressing on the cord constricted and softened it. The large tumour noticed during life near Poupart's ligament was attached to the anterior crural, and contained several cysts. The tumours were fibromata.

CASE XXXV.—Generisch,[1] in 1870, gave an admirable account of a most interesting case. Karl P., age 22, shoemaker. His mother died of carcinoma mammæ. She had numerous tumours in the axilla, along the ribs, in the precordial region, and in the muscles. (These, at the time of her death, were supposed to be enlarged or cancerous lymph-glands, but in view of the history of her sons, and their situation, it is not improbable that at least a part of them were neuromata.) Patient had never previously had a severe illness. Early in 1818, after exposure to severe cold, he began to experience acute pain in the ball of the left foot, which was renewed at every change in the weather. This pain finally became so acute that he sought admittance to the hospital. He was of medium size, looked like a malarial patient, lips pale and bluish, conjunctivæ and mucous membrane of mouth singularly colorless. He was an epispadias, and his voice was like that of a child. Numerous larger and smaller resistant fusiform tumours were found scattered over the entire surface of the body, the skin over them being normal. Some of them were spontaneously painful, others, especially the smaller ones just beneath the skin, became so on pressure. Those of the size of a hazel-nut, or larger, also those lying deeper, were either not at all painful on pressure, or only when considerable force was used. He said that he first noticed them when eight years old. They gradually enlarged and increased in number, some of them being as large as a pigeon's egg.

An examination of the blood revealed an increase in the relative number of the white blood cells. Neither the higher senses, nor the sense of touch, nor perception of heat, nor muscular power, were in the least degree impaired. Respiration and heart functions normal. About ten weeks before death he began to have intense pressing, stretching pain in the right buttock, which increased in severity. A rapidly growing tumour was discovered here which at the time of death had a diameter of 35 cm. In the mean time he began to have pain in the right foot, and presently took to the bed. The right foot and leg now became slightly anæsthetic, and assumed a position resembling talipes equinus; and extensive œdema occurred, extending up to the middle of the thigh. Temperature ranged from 38.5° to 39.7° C.; pulse frequent and soft. A persistent diarrhœa now set in. A very painful digital examination of the rectum showed that the gut was pressed upon by a firm rough tumour within the pelvis on the right side. Later, micturition became difficult: urine scanty, cloudy, with reddish sediment, and on several occasions contained albumen. The painful and sometimes bloody diarrhœa was not controlled permanently by the most powerful remedies. A bed-sore formed over the right trochanter. During the last days he several times experienced a sensation of coldness, but had no pronounced chill. He died suddenly of pneumothorax.

Autopsy.—In the lungs were scattered areas of broncho-pneumonia and small cavities connected with the smaller enlarged bronchi, through the walls of one of which the perforation had occurred. On the surface of both lungs numerous wedge-shaped, soft, whitish nodules were seen, as large as a hazel-nut, with the broad end outward. Plugs were found in some of the smaller arteries in the lung tissue. A few scattered neuroma were found along the bronchi. Brain and cranial nerves within the skull normal. The roots of the ciliary ganglion and the ganglion itself were thickened and unusually resistant. Small tumours were found on the oculo-motorius, right trochlearis, and on several branches of the trigeminus. The spinal cord was normal, but the spinal nerves outside the dura were much enlarged as they passed through the greatly widened intervertebral foramina, the change being most marked in the cervical and lumbar regions. The whole spinal canal was enlarged especially in the lower lumbar and sacral regions, having in the latter portion a diameter of more than 3.5 cm. Tumours of varying size were found in all the spinal nerves. The phrenics were beset with tumours of the size of a barleycorn. Both vagi were considerably enlarged and knobbed, and in some parts of the thoracic portion measured 9–12 mm. in diameter; upon and below the diaphragm were numerous tumours as large as a pea. Tumours were also found in the various plexuses. The sympathetic nerves were thickened and the ganglia enlarged. Both splanchnics and the intercostals present tumours, those of the latter nerve projecting through between the ribs into the pleural cavity. Several tumours were found in the subserosa of the stomach, in the porta hepatis, and were very abundantly distributed in the mesentery, the largest having the size of a pea. The true pelvis was filled with large subserous tumours, and such were also found in both iliac fossæ. Tumours of the size of a hen's egg were situated on the branches of the lumbar plexus, some of them containing cheesy masses, others completely calcified. The sciatics were enormously enlarged. The microscopical examination showed the tumours to be essentially fibromata, but some were distinctly sarcomatous, others myxomatous. The wedge-shaped masses in the lungs were sarcomatous, and the author regards them as metastatic. The above mentioned plugs in the smaller arteries of the lungs consisted chiefly of spindle-shaped cells somewhat resembling those composing the wedge-shaped nodules. The nerve fibres could be readily seen passing through the tumours, and the author concluded, after carefully counting the nerve fibres in transverse section before entering and within the tumours, that their number was not increased.

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[1] Generisch, Virchow's Archiv, Bd. xlix. p. 15.

The following case was reported by Vallender[1] and Gerhardt[2] :—

CASE XXXVI.—Jacob P. (brother of the last case), aged 34, single. First began to talk when seven years old, and stammered excessively. When fifteen years of age he received a blow on the right temple, which was followed by a painful bump. In a few days the pain ceased, but a small hard tumour remained, which gradually increased in size, giving him however no inconvenience. His intelligence was much below the average. On admission to hospital subcutaneous tumours of various sizes were found in different parts of the body. One on the temple measured 5 by 2.3 cm., and one on the right side of the jaw, about as large as a hen's egg, was painful on pressure. Several of the larger tumours were painful on pressure, the smaller ones not. The patient was aware of the existence of the tumours on the forehead and jaw only. The genital organs were normally formed, but the penis was small, and patient had never experienced sexual desire. The higher senses, cutaneous sensibility, and muscular power were unimpaired.

On Sept. 12, 1874, he got thoroughly drenched, and remained several hours in his wet clothes. On the 13th, he had difficulty in swallowing, which increased during the next day. Well-marked tetanus was now developed, from which he died on the 18th.

Autopsy.—Everywhere beneath the skin, and in many muscles, small fusiform tumours were found upon the nerves. Both pneumogastrics and phrenics were beset with numerous fusiform tumours: one on the right pneumogastric, just below the base of the skull, being as large as a goose egg. The spinal cord and the roots of the spinal nerves were normal. The larger vessels of the cerebral pia were distended with blood, the smaller empty through compression. Pia œdematous, with much fluid at the base. In the central ganglia were spots of diffuse redness. On section of the brain, circumscribed resistant nodules were found, most abundant in the right side, and having an average diameter of 1 cm. These were found in the left optic thalamus: on the right nucleus lenticularis and corpus striatum; in the vermis superioris cerebelli; in the cerebellar hemispheres; in the left corpus dentatum, and in both crura cerebelli. The microscopical examination of these nodules was not reported. The tumours of the nerves were fibromata.[1]

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[1] Vallender, De tumoribus fibrosis circumscriptis in tela cellulosa subcutanea. Berlin, 1863.

[2] Gerhardt, Archiv für klin. Medicin. Bd. XXI. p. 276.

The following is a summary of a case briefly reported by Wegener.[2]

CASE XXXVII.—Patient was seven weeks ill with typhoid fever, during which time complete and persistent deafness occurred. Numerous subcutaneous spheroidal tumours of various sizes up to that of a large hazel-nut were scattered over the body, movable but not painful. With the exception of the deafness, there were no symptoms pointing to disease of the nerves. Patient died in convalescence, from intestinal perforation.

At the *autopsy* numerous tumours were found on the pneumogastrics as they entered the chest. All the spinal nerves presented numerous tumours of varying size, which were especially abundant on the lumbar and brachial plexuses, and on the sciatics; they were also very abundant on the subcutaneous nerves, which in many cases presented a beaded appearance. Tumours were also found on the cervical sympathetic and along the lesser curvature of the stomach, also on the phrenic nerves. The brain and cranial nerves within the skull were normal, as was also the spinal cord. The nerves of the face were not examined.

The microscopical examination is said to have shown that the tumours were composed of amyelinic nerve-fibres.

The following case was described by Bruns,[3] in 1870.

CASE XXXVIII.—P. M., male; 33 years of age; general health good. He was born with a flat tumour on the left temple and left upper eyelid, which grew with the growth of the body; it was lobulated, irregularly nodulated, hanging in sack-line folds down to the ear covering the eye whose bulbus was atrophied. Knobby cords were felt within the tumour which has given him no special inconvenience. Six years ago he first noticed a tumour on the left side of the neck which was then about as large as a hen's egg, and lay just below the angle of the jaw. It continued to increase in size, and he came for operation. It was now about as large as the double fist, reached from the jaw to the clavicle and forward to the median line, displacing the larynx. It was freely movable sideways, but not up and down. The skin over it was normal. At first he had for a time no subjective symptoms, but two years before admission he began to suffer from a gradually increasing hoarseness which, however, never reached aphonia. During the last six months he had darting pains in the tumour, radiating to the ear and back of the head, as well as difficulty of breathing, which was accompanied by a whistling sound, especially after exercise. Vigorous movement of the tumour or strong pressure on it induced cough. On various other parts of the body hard tumours were found from the size of a barley-corn to that of a walnut, of whose existence he was unaware. An operation was performed for the removal of the tumour of the neck. On cutting down upon it a nerve was seen to enter it from below which proved to be the pneumogastric, and was severed. During the operation violent cough and intense suffocatory symptoms occurred, passing off after the manipulations ceased, when the breathing became normal. Patient did well until the tenth day after the operation when a profuse hemorrhage occurred terminating in death.

Autopsy.—The hemorrhage was occasioned by an ulceration through the wall of the carotid. The left vagus was beset with fusiform and spheroidal tumours from the size of a millet seed to that of a bean, down to its finest visible ramifications. On the right vagus tumours were found as large as a walnut. Tumours were also discovered on numerous other nerves; especially on the brachial plexus, the subcutaneous nerves, and on the sciatics and their branches. Some of these were as large as a pigeon's egg.

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[1] This case was made the subject of an inaugural dissertation by Dr. Carl Rump, in which the histology of the tumours is described at length, and which is epitomized in Virchow's Archiv, Bd. lxxx. p. 177.

[2] Wegener, erliner Klin. Wochenschrift, No. 2, 1870.

[3] Bruns, Virchow's Archiv, vol. l. p. 108.

A brother of the above patient had a congenital elephantiasis with plexiform neuroma of about the same size and shape and in the same region, and his mother had numerous wart-like tumours in the skin.

CASE XXXIX.—Czerny[1] records a case somewhat analogous to the last, in which an elephantiasis coexisted with multiple neuroma.

Therese G., age 25. Her great grandmother, grandfather, and mother were the subjects of more or less extensive elephantiasis, the character of this disease in the mother being, in many respects, similar to that in the daughter. Patient was born with a small tumour of the back, which grew rapidly, hanging down over the right buttock to the knee, producing deformity of the spine. The outer and front sides of the right thigh became covered with hard thick skin beneath, and within which a congeries of flattish spheroidal tumours of various sizes formed a thick knobby mass.

Various operations were attempted for the removal of portions of the large tumour, which became ulcerated in several places and undermined by abscesses, but she bore them badly. High fever and chills developed, paralysis of the left leg and partial paralysis of the left hand occurred, and she died of exhaustion.

Autopsy.—Several small abscesses were found beside the middle meningeal arteries, and a thrombus of the middle cerebral. Small abscesses and infarcta were found in the liver, spleen, and kidneys. Aside from the plexiform neuroma in the hypertrophied skin, in the right side of the pelvis and lying on the quadratus lumborum muscle, which was fatty, a great mass of larger and smaller tumours, involving the branches of the lumbar plexus, was found. The nerve cords connecting these tumours were greatly thickened, and the tumours and thickening of the nerves extended inward through the intervertebral foramina which were greatly enlarged. One of these tumours 4 by 2.5 cm. in diameter lay within the dura mater, compressing the cauda equina. The sympathetic in the same region was excessively involved, forming a part of the tumour mass.

The branches of the external and middle cutaneous presented beneath and within the thickened skin the usual characters of the plexiform neuroma. Other tumours were found along the leg. They were for the most part composed of connective tissue, although in some cases amyelinic nerve-fibres preponderated. Some contained numerous, very much elongated, cells which the author regarded as immature amyelinic nerves. Ganglion cells were also found in some.

The case reported by Prof. Kosinsky, of Warsaw,[2] in 1874, is in some respects unique, and, if it indeed belongs among the cases we are now considering, of great interest from the therapeutic standpoint:—

CASE XL.—A. B., age 30, soldier. When about sixteen years of age he first noticed several small painless tumours on the right lower extremity. Subsequently when marching they began to grow and become painful. They were over 100 in number, and were scattered over the posterior and outer surface of the thigh to its lower third, and also on the buttock. They were spheroidal or ovoidal, mostly hard, and varied in size from a pin's head to a hazel-nut. The skin in their vicinity was dry, rough, and scaly. Pressure, especially on the larger tumours, caused intense radiating pain. Walking induced pain, but when at rest it passed off. They corresponded to the branches of the lesser sciatic and external cutaneous.

After a trial of various medicaments a portion of the lesser sciatic was excised, and while the wound was healing by suppuration the tumours began to diminish in size, and after four months many of them had entirely disappeared, and the remainder gave him no trouble whatever.

In 1878 Gerhardt[3] described a new case whose prominent features are the following:—

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[1] Czerny, Archiv für Klin. Chirurgie, Bd. xvii. p. 357.

[2] Kosinsky, Centralblatt für Chirurgie, July 18, 1874.

[3] Gerhardt, Deutsches Archiv für Klin. Med., Bd. xxi. p. 268.

CASE XLI.—P. R., age 30, day labourer. Father died at 50 of nervous fever. Mother healthy, but occasionally has cramps of the legs. Since early youth he has had numerous hard tumours beneath the skin in various parts of the body which have not been painful, and have not increased in size. After getting wet through while heated, he began to feel pain in the cervical region, and some of the vertebræ became unusually prominent. The left arm and hand grew weak, and subsequently the left lower extremity. He experienced the sensation of a band around the body; had pain in the back, and convulsive movements in the left hand and foot. On admission to the hospital in Würzburg (the fifth Würzburg case), he was well nourished; head held to the left; partial paralysis of the left facialis. Memory and intelligence unimpaired. Atrophy of muscles in the upper extremities, and finer movements of the fingers imperfectly executed. Partial paralysis of both legs, with constant fibrillar and fascicular twitchings in left thigh. Sensibility diminished in both forearms and legs. Numerous tumours evident in various parts of the body, one as large as a hen's egg. Pressure on the sciatics caused severe twitching in the muscles of the thigh. Patient died of typhoid fever, exhausted by profuse bloody diarrhœa.

Autopsy.—The usual lesions of typhoid fever were found. Brain anæmic; nerves of basis intact. Small tumours were found on the oculo-motorius, trochlearis, abducens, and on the branches of the fifth pair and glossopharyngeals. Both pneumogastrics were studded with tumours as large as a bean in the cervical region, and many were found on the thoracic plexuses and along the bronchi far into the lungs and in the larynx.

In the spinal canal, in the cervical region, and in the foramen magnum, small tumours lay upon and compressed the cord and medulla, and the intervertebral foramina in the cervical region were enlarged and filled with tumours and swollen nerves. The brachial and lumbar plexuses were greatly enlarged and covered with tumours, forming large, shapeless, knobby masses. The left sciatic was so large that it could hardly be surrounded by the fingers of one hand, and the right was about two-thirds as large. The flattened fusiform tumours on some of the subcutaneous nerves of the thigh were so abundant as almost to conceal the muscles beneath. In the sympathetic also the lesion was extensive, especially in the superior thoracic region. At the origin of the aorta and pulmonary artery, a large compound tumour quite surrounded the vessels, and had produced considerable erosion of the vertebræ beneath. Various branches of the sympathetic in the abdomen and pelvis were thickened and beset with tumours. In front of the left kidney lay a tumour one-fourth larger than the organ itself, connected above with the solar plexus. At the porta hepatis lay numerous masses of tumours, and some were found along the arteries within the organ, even out to the finer ramifications. The mesentery was studded with small tumours; many were scattered over the surface of the intestines; several lay along the seminal vesicles and beside the pancreas.

With the hope of establishing some other means of definite diagnosis than extirpation, Gerhardt made some interesting observations on his patient with the galvano-puncture. Selecting a tumour on the outer side of the rectus femoris, which seemed to belong to the cruralis, a fine needle connected with the cathode was carried into it, while the anode by means of a moistened sponge was put in connection with the skin over the patella. By the use of five elements only, contractions were produced in the vastus externus, while by cutaneous galvanization alone, twitching was first produced by the use of twenty-five elements. A few days later the experiment was repeated, when eight elements were necessary to produce the contractions. When the needle was stuck into a small superficial tumour of the cutaneous nerves, after a short time, pain regularly occurred, followed by strong reflex spasm of the whole extremity. In view of these results, the author suggests the possibility of a physiological diagnosis of the neuroma.

If now we make a brief analysis of these records, we find that in the 32 cases in which the sex is recorded, 24 were males, 8 females. The average age at the time of death is 34. The duration of the disease it is difficult to determine, on account of the entire absence of symptoms, which many of the cases present in their early stages; but in some, the tumours were observed at a very early age, and in others they were unquestionably congenital. The association of the specific nerve lesion with neuroses and malformations is worthy of remark. Two cases were cretins, one an idiot; two are recorded as of weak intellect; one was a crypsorchis; in one the penis was small, and there was entire absence of sexual proclivity; in one there was an inconsiderable irregularity in the lobulation of the lungs; one was an epispadias. In two the lesion was associated with elephantiasis. The clinical history is most remarkable in the variety and lack of uniformity of the symptoms, and the marked discrepancy between these and the anatomical lesion in many of the cases. In the 26 cases in which a fairly complete account of the symptoms is preserved, 12 presented no symptoms whatever pointing to a lesion in the nervous system. In the remaining 14, a greater or less degree of paralysis was present in 8; more or less pain was experienced in 13, and this of the most varied character; sometimes spontaneous, sometimes occurring only on pressure on the tumours, and in some cases influenced by atmospheric changes. Diminution in cutaneous sensibility was observed in 4 cases; convulsive movements in 4; abnormality in respiration in 4; palpitation in 1. Headache was a prominent symptom in 2 cases, in one of which there were brain lesions. Leucocythosis was observed in 2 cases; alteration of the muscles in 3. Diarrhœa occurred toward the end of life in 6 cases, contributing to, or inducing the condition of weakness and debility in which many of the cases died. Among the immediate causes of death we have: typhoid fever, 5; cerebral apoplexy, 1; gastro-enteritis, 1; cholera, 1; phthisis pulmonalis, 3 (one with tubercle); pulmonary gangrene with pleurisy, 1; pneumothorax, 1; pneumonia, 2; tetanus, 1; hemorrhage, 1; pyæmia, 1; and the remaining cases terminated, for the most part, in general debility and exhaustion, some with hectic, others with diarrhœa. Tumours in the brain were found in 2 cases; within the spinal canal in 4. They were found in most of the peripheral nerves in 27 cases, and were confined to special groups of nerves in 10. The sympathetic was affected in 14 cases. The pneumogastrics were affected to a greater or less degree, sometimes excessively so, in 17 cases; only 3 of these, however, presented abnormalities in respiration, and 1 of them suffered from palpitation. (The remaining case in which affection of the respiratory movement occurred was living at the time of the report.)

Further, the subjects of this disease, so far as the records show, as a rule, bear operative interference badly; in some cases the remaining tumours having grown more rapidly after operation; in others the wounds healed slowly; in some, the patients dying from exhaustion, and in one from pyæmia. In regard to the remarkably frequent occurrence of typhoid fever in these cases, little more can be said at present, than that it is, at least, a dangerous complication. It may be further noted that the special senses are usually unaffected, but there are exceptions. The lesion of the nerves does not, in most cases extend into the hands and feet.

So far as the diagnosis is concerned, it will be seen, from the above analysis, that it is at best uncertain and difficult. Pain, which is so frequent an accompaniment of the single neuroma, is here frequently entirely absent, and when it does occur is often not definitely localized. There may also be the most perfect control of muscular movement while enormous changes have occurred in both central and peripheral nerve trunks. Numerous hard or soft tumours, in different parts of the body, arranged along the course of the nerve trunks, ovoidal or fusiform in shape, not attached to the skin, and movable transversely, but not longitudinally, whether painful or not, may justly give rise to a suspicion of the existence of this disease; and the galvano-puncture, as a possible means of diagnosis (Gerhardt, loc. cit.), is to be borne in mind.

A consideration of the propriety of employing the term neuroma, for tumours which, in the majority of cases, do not apparently contain new-formed nerve-tissue, would carry the writer beyond the scope which he has assigned to the present paper.

Article XI.

On the Physiological Action of Potassium Nitrite. By Edward T. Reichert, M.D., Demonstrator of Experimental Therapeutics in the University of Pennsylvania, With a Note on the Physiological Action on Man, by S. Weir Mitchell, M.D., Member of the National Academy of Science.

The very great value of amyl nitrite in warding off impending paroxysms of epileptic convulsions, angina pectoris, and asthma, has been so generally recognized by the profession, that the discovery of a new salt whose physiological action is identical with it, and yet which possesses some superior therapeutical properties, must obviously elicit in the clinician a deep interest similar to that experienced by the experimental therapeutist. The very prompt and efficient action of amyl nitrite in the treatment of the above diseases is undoubtedly dependent upon both its physical and physiological properties, and it is concluded that its exceeding volatility imparts to it an action of extraordinary rapidity, as well as of notable transientness. It must therefore be apparent that what the salt has thus gained in the rapidity of its action it has lost in permanency, and on this account has been found to be entirely unsuitable for constant administration when it has been deemed advisable or necessary to maintain a continuous systemic influence, and it has therefore been found to be therapeutically of little value in the treatment of the above diseases, except when it was possible to use it in warding off impending paroxysms, the therapeutist in the interim being compelled to resort to such other medicines as have been found valuable, though unfortunately oftentimes not efficient.

It is, therefore, evident that if a preparation could be obtained whose physiological action would prove to be identical with that of amyl nitrite, but whose effects would be more permanent and therefore suitable for maintaining a continuous systemic influence, we would have an addition to our materia medica which would fill a very apparent therapeutic void: for if amyl nitrite has proved so valuable in the treatment of certain paroxysmal disorders, why should not a salt with greater stability of action be equally as efficient in the treatment of these cases in the interim? Such a preparation of greater stability of action we have in the potassium nitrite, and while studying its physiological action I purpose discussing in connection with it the experimental researches on amyl nitrite, which have been made by different investigators, hoping thereby to make the subject of the identity of action at once evident, and at the same time to note certain errors that have occurred in the conclusions drawn from the results of some of their individual studies.

I take great pleasure in expressing my obligation to Dr. S. Weir Mitchell for his kindness in furnishing me the potassium nitrite for physiological experimentation, and for the detailed results of the experiments made upon himself, as well as those made by one of the students at the University, under his supervision and direction.

General Action.—In *frogs*, the drug in large or toxic doses causes at first a state of restlessness and excitement which lasts for a few minutes; this condition is succeeded by one of quietude, and attended with a progressive depression and final extinction of muscular irritability, as is evinced by the inco-ordination of voluntary movements and ineffectual attempts to jump, and finally by the complete absence of irritability to galvanic stimuli. Consentaneous with the incipient period of locomotor depression, the animals merge into a condition of narcotism, in which state, when they are placed upon their backs, they are unable to resume their normal postures, or indeed may show no tendency whatever to do so. Reflex action is also diminished. Immediately following this well marked narcotic state, muscular twitchings occur which are not unfrequently succeeded by convulsions and death. Convulsions do not invariably occur, but when present are clonic in character, and are usually preceded by either twitchings or well-marked spasms in groups of muscles. Occasionally a tetanoid condition is present. Notwithstanding the diminution of reflex irritability which was noticed to occur previous to the convulsive stage, yet during the existence of the latter, reflex irritability appeared occasionally to be somewhat restored, for it was found that very slight mechanical stimulus was sufficient to cause very pronounced convulsions. This fact suggests a depression of inhibitory reflex centres, or asphyxia, for it was found that in animals poisoned with the potassium nitrite, the blood was of a uniform dark venous colour, having a peculiar chocolate shade. This will be more fully referred to hereafter. (See *Blood.*)

In the lower *mammals* the stage of excitement is not generally well marked, and, as has been observed, is frequently altogether absent. If the stage of excitement is present, that of depression rapidly supervenes, and if the dose be toxic it gradually deepens into death. Both the pulse and respiration rates are notably increased. The pulse is increased in frequency, but diminished in force, as is shown by tracings made with the kymograph, and if the dose be toxic, the increase gradually subsides to the normal, and continues sinking till death ensues. The respirations after large doses are profoundly affected, and may be increased from one-half to two-thirds that of the normal, being also deeper; after very large or toxic doses they become frequent, deep, and laboured, and not unfrequently extremely hurried and panting, and then gradually becoming slower and shallower as death approaches. Reflex activity is diminished and muscular inertia appears. If the dose be lethal, death ensues from a failure of the heart or respiration, consciousness remaining present almost to the end, and sensibility being but slightly impaired. Convulsions were seldom observed to occur in these animals.

In *man* the greatest interest of an experimental study of the physiological action of any drug must naturally centre, I therefore give somewhat in detail the results of the experiments made by Dr. Mitchell, the student above referred to, and by myself, upon our own persons.

The following is the report handed me by Dr. Mitchell:—

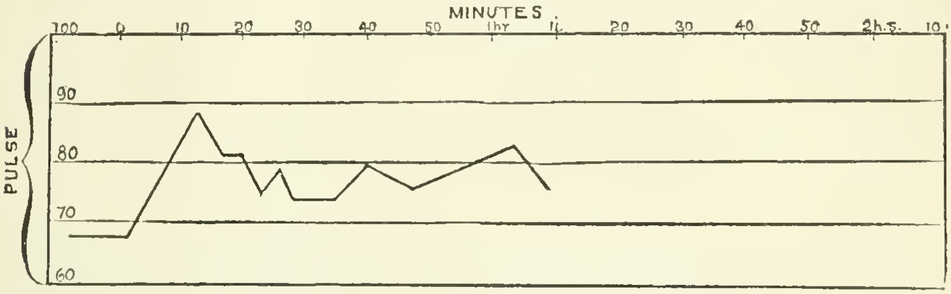
"Last autumn Prof. Wolcott Gibbs asked me to study the physiological effects of the alkaline nitrites—and furnished me with specimens. I began in October by testing them carefully on myself, and found that in doses of four to seven grains they caused acceleration of the heart's action and a sense of cerebral fulness, with flush of face and sometimes of the extremities. I then placed the specimens in Dr. Reichert's hands, and while he was making the physiological study which he now reports, made, or had made, with the aid of Mr. Guy Hinsdale and Mr. Angell, a fuller but as yet too brief study of the effects of these drugs on man. I have also begun to give them in epilepsy, and suggest their use in the chill of ague and in eclampsia, as well as in asthma.

"The following are as yet the only experiments made on man in health. My therapeutic examinations I hope to publish before long, as well as a detailed account of the effects of alkaline nitrites in healthy people when given steadily in various doses, small or large.

"*Feb.* 3. I took in the morning fasting, six grains of potassium nitrite, my pulse being 78. As I was occupied in seeing patients, I did not notice the heart until after the lapse of 40 minutes, when it began to be felt. It was then 110. The vessels in the neck were throbbing slightly, and my face felt warm. At the 120th minute I took again 6 grains, the heart being down to 90, but it seemed to me to be more than usually excitable from an active run up stairs. The new dose again in 30 minutes raised the pulse to 110, and a little later to 118; I also felt more fulness of head. Doses of 2 grains thrice daily did not alter the pulse. At first the medicine gave rise to unpleasant regurgitation, having a taste like that of phosphorus. This no longer troubled me if I took the drug fasting and with an excess of alkali.

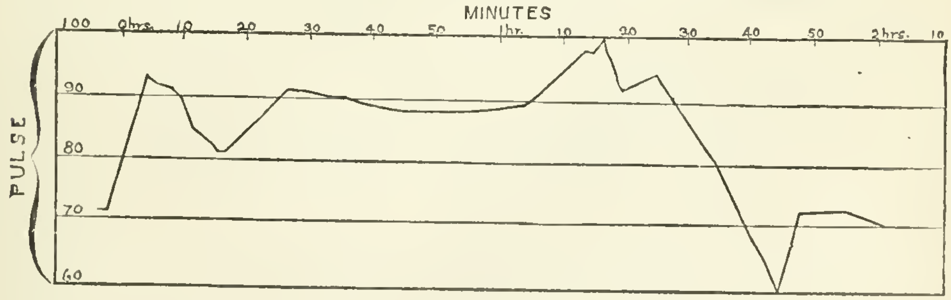
"24*th*. Having made several like testings, I took within a half hour 10 grains. This in 25 minutes sent my pulse to 120, flushed my face, and my hands also, and caused a sense of intra-cranial throbbing. In a word, the potassium nitrite caused all the symptoms which are more abruptly developed by amyl nitrite. I add the following careful records of experiments made on himself at my request by Mr. Guy Hinsdale, student of the University of Pennsylvania:—

"*March* 27, 1880. *Experiment, No.* 1.—Dose, 5 grains per stomach.



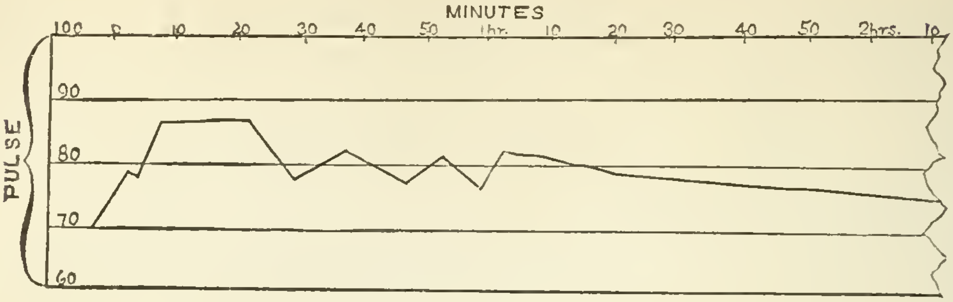
"5 min., pulse full, sensations of slight fulness in the head, and some flush in the face; twelve minutes, pulse full and hard; twenty-five minutes, escape of gas from the stomach tasting like phosphorus, which continued at intervals for fifteen minutes; seventy minutes, pulse irregular. At the end of four hours the pulse was seventy-six, and throbbing of blood in the head noticed, but not very annoying. *Temperature.*—Normal temperature, 98.8; in ten minutes, 98.6; fifteen minutes, 98.6; twenty minutes, the same; thirty minutes, the same; forty minutes, the same.

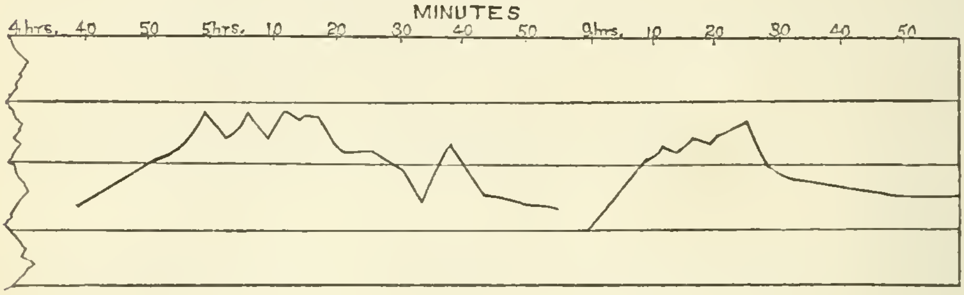
"*April* 3, 1880. *Experiment, No.* 2.—Dose, 3 grains per stomach.



"2 min., a sense of heat in the head and over the whole upper part of the body; three minutes, a disagreeable fulness in the head; twelve minutes, pulse irregular and full; twenty minutes, the disagreeable feeling in the head has disappeared, but the strong taste of the phosphorescent gas is present, and the belching of the gas frequently occurs, the pulse is irregular and full; twenty-four minutes, the pulse is very irregular and full; seventy-five minutes, pulse full and outrageously irregular; one hundred and twenty minutes, through the last half of the last minute the pulse is full and regular.

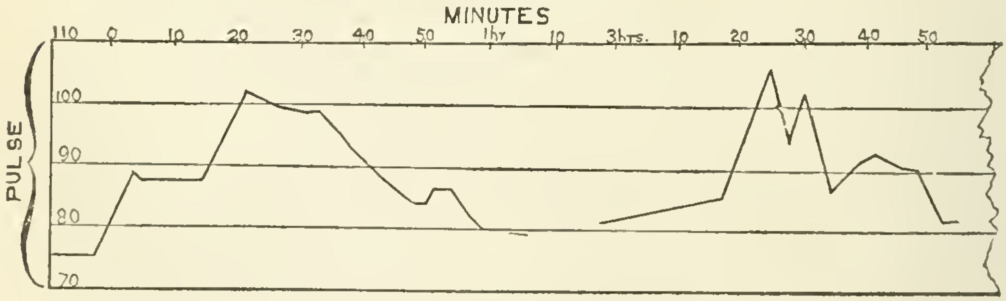
"*April* 5, 1880. *Experiment No.* 3.—Dose 3 grains per stomach.

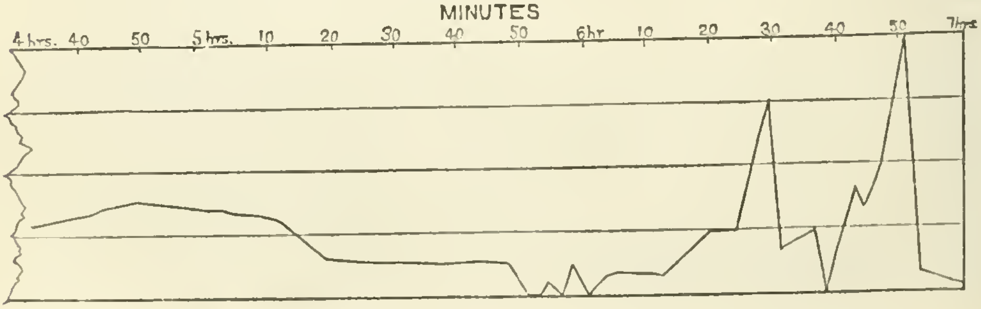




"5 min, pulse full; fifteen minutes, phosphorescent gas raised, which continued at intervals for thirty minutes; thirty-five minutes, pulse irregular; eighty minutes, took dinner; four hours fifty-two minutes, took three grains of potassium nitrite; fifth hour, a slight feeling of heat in the face; fifth hour three minutes, phosphorescent gas raised from the stomach, which continued at intervals for a half hour; sixth hour forty minutes, took supper; ninth hour five minutes, took three grains of potassium nitrite; thirty minutes, escape of phosphorescent gas; tenth hour, six minutes, pulse 76. Between the first hour three minutes and the fourth hour forty minutes the pulse-rate gradually declined, and between the fifth hour forty-five minutes it gradually declined up to the ninth hour, when another dose was taken, which sent it up again.

"*April* 29, 1880. *Experiment No.* 4.—Dose, 7 grains per stomach.





"1 hr. and 30 min., took dinner; third hour fifty-eight minutes, took ten grains potassium nitrite; fourth hour five minutes, flush of face and warmth of body; fifth hour forty-seven minutes, took eight grains; sixth hour three minutes, took five grains; thirteen minutes, took five grains. The whole amount of the salt taken during the day was thirty-five grains. The pulse at 6 A. M. the following day was sixty. Between the first hour ten minutes and the third hour the pulse-rate gradually rose, and after the seventh hour gradually sank until the ninth hour twenty minutes, when I retired for the night.

"It is clear from these brief studies that it is possible to take considerable doses of the nitrites without injury. The irregularity of heart caused by them is remarkable, and it remains to be seen if their chronic use will cause the same results.

"I was not sure that the heart became feebler as the pulsations increased in frequency, although that was what I believed likely to occur. Mr. Hinsdale thought that his pulse became weaker as the heart beat quicker. I have now several epileptic patients taking the nitrites in rising doses with the view of seeing if the fits are thus controllable. I have no doubt that in the epileptic status the alkaline nitrites would have in a more lasting shape the same value which years ago I showed to belong to the amyl salt."

The following experiments were made upon myself:—

Exp. No. 1.—At 12.58 P. M., pulse 17 in 15 seconds; .59, took four grains of potassium nitrite; at 1 o'clock, a slight sense of warmth is experienced in the stomach, and a sensation of slight fulness with a desire to belch; at .02, pulse 18 in 15 seconds; .05, pulse 20 in 15 seconds, a slight flush in the face is apparent; .07, after stooping a moment my face became greatly flushed; .09, pulse 20 in 15 seconds, and slightly irregular, a sensation of diffused warmth is experienced, especially so in the feet and hands; .13½, pulse 20 in 15 seconds; .21, pulse the same, an occasional flushing is felt, and a small amount of gas has been raised from the stomach, which has a taste resembling very closely the disagreeable fumes given off from burning sulphur matches; a slight fulness is experienced in the head; .30, pulse 21 in 15 seconds, I can appreciably feel the pulsations in my head; .40, pulse 19 in 15 seconds; .50, pulse 20 in 15 seconds; at 2.04, pulse 19 in 15 seconds; .17, pulse the same; .35, pulse 17 in 15 seconds.

Exp. No. 2.—At 9.08 P. M., pulse 34 in 30 seconds; at .08¼, took eight grains of potassium nitrite; .09, pulse 36 in 30 seconds, a sensation in stomach as if gas had collected there; .14, a flushing of the face apparent, although but slightly marked; .17, pulse 37 in 30 seconds; .27, pulse 40 in 30 seconds, face slightly flushed, with perceptible pulsations in the head; .33, pulse 40 in 30 seconds; .39, phosphorescent gas raised from the stomach; .48 pulse 40 in 30 seconds; at 10.04, pulse 38 in 30 seconds; .30, pulse 34 in 30 seconds; at 11.25, pulse the same.

Exp. No. 3.—At 10.04 A. M., pulse 38 in 30 seconds; at .05, took ten grains of potassium nitrite; .06, a fulness in the stomach is experienced and an emission of the disagreeable phosphorescent fumes; .07, pulse 39 in 30 seconds, a slight warmth is apparent, which is universally diffused over the whole body, but especially in the lower limbs; .10, pulse 43 in 30 seconds; .13, pulse 44 in 30 seconds; .20, pulse 45 in 30 seconds; .29, pulse 48 in 30 seconds; since .07 I have experienced transient flushings of my face at brief intervals, and at present it is flushed with an appreciable feeling of fulness in my head; .41, pulse 48 in 30 seconds; when I arose from my chair the very slight exertion caused my heart to beat rapidly and violently, and each pulsation was distinctly felt in my head, and indeed also heard, for each pulsation was distinctly audible, and seemed as though the carotids were beating violently against the skull; .49, pulse 45 in 30 seconds; at 11.15, pulse 49 in 30 seconds; .27, pulse the same, transient flushes still experienced; .37, pulse the same; at 12, pulse the same; at 1, pulse 50 in 30 seconds; .50, pulse 48 in 30 seconds; I have been slightly nauseated since twelve o'clock, and at 1.30 vomited—the nausea and vomiting I attribute to the extreme disagreeableness of the phosphorescent fumes generated in the stomach, and not to any specific action of the drug on the stomach or vomiting centres; at 2.45, pulse 50 in 30 seconds; 3.40, pulse 44 in 30 seconds; 4.40, pulse 36 in 30 seconds; 5.25, pulse 38 in 30 seconds; 6.30, pulse the same. After the vomiting I felt much better since very little of those nauseating fumes were emitted, yet a slight feeling of discomfort was experienced until late in the afternoon, but by six o'clock I felt entirely recovered and fully enjoyed my dinner. I also noticed during this last experiment that my heart was exceedingly irritable, and that slight exertion, like climbing the stairs, would cause the pulsations to become markedly accelerated. Although I took no particular note of the respirations, yet they did not appear to be appreciably affected by these doses.

It will be noticed in comparing the results of the above experiments made by Dr. M., Mr. H., and myself, that there is quite an appreciable difference in the action of the salt on the pulse of each of us. Thus, the record obtained by Dr. M., when compared with those made by Hinsdale and myself shows that he is more susceptible to it, for although both Hinsdale and myself took doses equally as large, yet in no instance did we find a rise as great. (Dr. M. however tells me that he is particularly susceptible to medicines which act on the heart.) It is also noticeable that the pulse-record obtained by Hinsdale shows more or less oscillation in the number of beats; while that obtained by myself shows that the pulse rose continually to the maximum and remained within several beats of it until the return to the normal. Hinsdale makes frequent note of the irregularity of the heart, but Dr. M. makes no mention of this, and in myself very little irregularity was apparent.

The *local action* is in all respects identical with that of the amyl nitrite, excepting that it is irritating. The marked paralysant effect, when applied to any of the highly organized tissues, is very prompt, this action being of a physiological rather than of a chemical character, since the tissues will occasionally regain their functional activity, even after almost a complete suppression has occurred. The drug is irritating, causing pain when injected hypodermically, or when applied to a raw surface; and when placed on a motor nerve I have frequently witnessed marked fibrillary contractions occur in the muscles supplied by its filaments, although I have never observed any reflex action to supervene upon its application to a sensory nerve of a decapitated frog, or any movement occur when placed upon a striated muscle. When a few fragments of the crystals are placed upon the exposed heart of the frog, an irregular contraction occurs, in which condition the point of the viscus on which the poison was placed appears as if thrown into a state of tonic contraction, as is evident by the depressed condition of the heart's surface and the pale anæmic appearance, which was obviously due to the contraction of the fibres thus acted upon, causing a bloodless condition of this poisoned area.

Conclusion.—*Local Action.*

Potassium Nitrite: When locally applied is an irritant, and a depressant to all the highly organized tissues, the diminution or loss of function being of a physiological and not of a chemical character.

Amyl Nitrite: "Nitrite of amyl causes a progressive loss of functional power in every highly organized tissue with which it comes in contact. . . . If the contact be not continued too long, the tissue may recover even after a total suppression of its function."[1]

Nervous System.—Upon the *brain* the salt evidently possesses some slight narcotic influence, although this action is so far superseded by others more potent, that it sinks into insignificance. In mammals I have not unfrequently noticed a disposition to sleep after large hypodermic injections, but have never observed any marked narcotic effects. In frogs, however, as has been before mentioned, a different result was obtained; and in animals in which the skullcap was removed and the solution or crystals applied directly to the cerebral surface, it was found that within twenty seconds after the application of the poison the animal became restless, the restlessness being speedily followed by narcotism which was very pronounced after two and a half minutes from the time of administration. The convulsions which have been referred to as occurring in frogs and occasionally in mammals, are of cerebral origin, and not peripheral, as has been proven by the following investigation: In order to determine this point a number of frogs were taken, and either the abdominal aorta or one of the femoral arteries was ligated, thus excluding the access of the poison to both or one of the posterior extremities, and it was found that convulsions of the whole body and extremities still occurred when the non-poisoned limbs were irritated, showing that the convulsions were not peripheral in origin. Another lot of frogs were then taken, and section of the spinal cord made in the upper dorsal region, and sufficient time being allowed to elapse for the animals to recover from the shock of the operation, the drug was given as before, when it was found that unexceptionally when convulsions occurred they were present in the anterior extremities alone, showing that they must therefore be of cerebral origin; this fact being somewhat substantiated by their being clonic in character. The occurrence of convulsions in mammals being so exceptional, caused a further investigation of this comparatively unimportant action in them to be passed by without a more detailed experimental study. Brunton (*Journal of Anatomy and Physiology*, vol. v. p. 72) and Wood (*Therapeutics*, 1879, p. 349) believe the convulsions to be of cerebral origin and due to asphyxia. Meyer and Friedrich (*Archiv Experim. Path. Pharm.*, vol. v. p. 58) states that the tetanoid condition (see *General Action*) must be due to an irritability of the spinal cord, but this conclusion is scarcely tenable because this condition may be due to asphyxia, or a depression of the inhibitory reflex centres of the cord, and no spinal irritability was proven by them to exist.

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[1] The quotations on the action of amyl nitrite cited in the conclusions are from Dr. H. C. Wood's Therapeutics, Phila. 1879, pp. 346–352.

Conclusion.—*Brain.*

Potassium Nitrite: On the brain of mammals it possesses a very feeble narcotic influence; on the frog it is more marked. The convulsions are clonic in character and cerebral in origin.

Amyl Nitrite: "Convulsions . . . are in all probability cerebral, not spinal, and due to the asphyxiating influence of the poison."

Upon the *spinal cord* the salt exerts a marked paralytic action, and the loss of voluntary motion and reflex activity is undoubtedly dependent to a very great extent upon this action, although, as will hereafter be seen, both the nerves and muscles are alike deleteriously affected. Reflex activity is progressively diminished from the first, never being preceded by an increase (Wood—Amyl nitrite, *loc. cit.*), and generally after the lapse of about twenty or thirty minutes from the time of administration of the salt has suddenly and entirely disappeared. The progressive diminution of reflex irritability was in several instances in my experiments, interrupted by a return of reflex activity, partially at least, to the normal; the probable reason of this being, as before stated, asphyxia or a depression of reflex inhibitory centres. The cause of the sudden cessation of reflex irritability, as was noted to occur in most cases, I have as yet been unable to experimentally determine. If a concentrated solution or a few fragments of the crystals be placed upon the exposed cord of the frog, the irritant action is at once evinced by the muscular twitchings which occur in the posterior extremities; this irritant action is followed by one of powerful and progressive depression which gradually deepens into a condition of complete paralysis, affecting alike both the motor and the sensory centres. Thus I have found that mechanical irritation of the cord above or at the poisoned area, would cause a very feeble response in the posterior extremities, as compared with that previous to the administration of the poison; and that after a while even mechanical stimulus failed to elicit a response, although a weak faradic current would produce the desired result. Shortly, even this current was found to be of no avail, and a constantly increasing strength of current was necessitated in order to obtain the slightest evidences of its application; finally, even the strongest current obtainable from a Leclanché cell and a Du-Bois Reymond Induction Coil failed entirely to cause the least perceptible effect. When the cord was now stimulated below the poisoned area, it was found that the strongest current failed to elicit any reflex movements in the anterior extremities, although feeble stimuli caused marked response in the posterior extremities; and when applied to the upper non-poisoned area it caused very pronounced reflex movements in the anterior extremities. These facts certainly show that the failure of the cord to convey impulses generated above the poisoned area through it to the motor nerves was due to a paralysis of either or both the motor centres or motor conducting fibres; and that the failure to conduct impulses upwards when the cord was galvanized below the poisoned area, was due to a paralysis of either or both the sensory centres or conducting fibres. It seems therefore proven from the results of the above investigations, that if the salt is applied to the spinal cord in concentrated form, it acts as a direct local irritant, this action being dependent upon peculiar chemical properties, and is not physiological in character—for we have already been made aware of its irritating nature when locally applied, and that when small diluted quantities reach the cord, as after hypodermic administration, no such action is present; therefore, the true physiological action is that of a powerful depressant (Wood—Amyl nitrite, *loc. cit.*), both the motor and sensory portions becoming alike depressed, and finally completely paralyzed. It seems evident, however, when we refer to the general action of the salt, that the motor portions are by far the most susceptible to this toxic influence, being the earliest to succumb, and are undoubtedly very greatly depressed before the sensory portions are to much of an extent affected (Wood, *American Journal of the Medical Sciences*, July, 1871, pp. 48, 49).

Conclusion.—*Spinal Cord.*

Potassium Nitrite: Both the motor and sensory portions are alike deleteriously affected, becoming depressed and finally completely paralyzed; and that the motor portions are by far the most susceptible to the poison, being greatly depressed before the sensory portions are much affected.	*Amyl Nitrite:* "On the motor centres of the cord the nitrite acts as a direct and powerful depressant . . . over the sensory . . . centres . . . has but little power, they are among the last portions to be affected."

The action on the *motor nerves* is identical with that on the motor portions of the spinal cord. Thus, it was found that when the crystals or a saturated solution were applied to the sciatic nerves, fibrillary contractions of the muscles occurred to which the filaments were distributed, although this was not as in the spinal cord invariably the case. This irritant action is soon followed by one of a very pronounced paretic character, by which the functional power of the nerve is rapidly and progressively diminished and finally completely extinguished, for it was found that powerful galvanic stimuli elicited no response whatever in the muscles supplied by the poisoned nerve, although the muscles themselves were irritable. No condition of irritation of the nerves can be detected after hypodermic injections, but the marked depression is, however, always pronounced, and this is no doubt the true physiological action of the salt—the irritated condition, like that of the spinal cord, being dependent upon the peculiar chemical properties of the salt, being only observed when it is locally applied in concentrated form.

Conclusion.—*Motor Nerves.*

Potassium Nitrite: The functional power of the motor nerves is progressively diminished, and finally completely extinguished.

Amyl Nitrite: "On motor centres . . . is a direct and powerful depressant, . . . exerts a similar but less pronounced action on the nerves, . . . decreasing but not destroying their functional life."

The *sensory nerves* are also depressed and finally paralyzed, for in several experiments made upon frogs it was found that within two minutes after the local application of the potassium nitrite to the sciatic nerve, no reflex phenomena could be induced by galvanization of the nerve on the peripheral side of the poisoned portion, although the reflex response was very prompt when the nerve was irritated on the central side. By referring again to the general action of this salt, it appears probable that an appreciable diminution of the function of these nerves does not occur until very late in the poisoning, and that practically, therapeutic doses have no effect. The lateness of the occurrence of a diminution of sensation has been noticed by several experimenters in their investigations with the amyl nitrite.

Conclusion.—*Sensory Nerves.*

Potassium Nitrite: The sensory nerves are depressed and ultimately paralyzed, but are not depressed to any appreciable extent by therapeutic doses.

Amyl Nitrite: "Over the sensory nerves . . . has but little power, they are among the last portions of the body to be affected."

In a further experimental study in frogs of the action on the nervous system to find the order in which the different portions were functionally extinguished, it was found that the centres of the cord were seriously affected before the nerves and muscles, and that cerebral paralysis preceded all of them, for even after unconsciousness supervened reflex phenomena could be induced. In a number of animals in which either the abdominal aorta or both femoral arteries were ligated, thus cutting off access of the poison to the nerves of the posterior extremities, after a while it was found that no reflex response could be induced by galvanization of the sciatic nerve, showing that the non-transmission of the impulses thus generated must be due to a depression of some portion of the cord, for certainly the sensory nerves must still be intact and capable of conveying impulses, as such is shown to be the case in an unpoisoned animal similarly operated upon, or when a single femoral artery was ligated, the same result being observed, no difference which nerve was stimulated. In another series of experiments, it was found that no reflex phenomena were present when the sciatic nerve was galvanized, yet, when the electrodes were placed upon the exposed spinal cord, a marked response was seen in the muscles of the posterior extremities. The total absence of reflex irritability in these cases, and the presence of irritability in the motor portions of the cord, suggests at once that such a loss was dependent upon a paralysis of the sensory centres. But this inviting explanation is undoubtedly erroneous, for we have already seen that sensation is among the last portions of the body to be seriously affected, and that mobility is impaired first. The true explanation probably is that the sensory portions of the cord are depressed, but the motor portions are more profoundly so, although the centres are still capable of perceiving and reflecting impulses generated by *powerful* stimuli. Further investigation shows that after the motor centres and tracts fail entirely to convey impulses to the motor nerves, yet, when the electrodes were applied to the sciatic, a marked contraction of the muscles of the extremity occurred. Even after no perceptible effort could be induced by galvanization of this nerve with the strongest current, the muscles were still found to respond to galvanization, although feebly. The results of these experiments indicate that the cerebral functions are the first to be completely extinguished, followed by the motor centres, motor nerves, sensory centres and nerves, and muscles. It is impossible, so far as our knowledge goes, to determine in the above instance the exact relation which the time of the occurrence of the paralysis of the sensory centres and nerves bears to the other parts of the nervous system.

The *circulation* is profoundly affected, both the pulse and arterial pressure giving striking evidences of a very powerful influence. Thus, the *pulse-rate* is from the first increased, with diminished force, and, if the dose be large or toxic, finally subsides to the normal, and continues in a steady decline till death or a reaction ensues. In man, as is shown in the experiments previously recorded, the increase amounts to from about one-third to one-half of the normal; in dogs and cats it is equal to about one-half of the normal. In these latter animals it was found that the increased pulse-rate occurred after section of the vagi nerves, suggesting that it was due to a depression of the inhibitory centres. Filehne (*Pflüger's Archiv*, Bd. ix. p. 490) and Mayer and Friedrich (*Archiv Exper. Path. Pharm.*, v. 63) conclude from their experimental studies that this is the *modus operandi* of the action of the amyl nitrite. The former observer, after dividing the vagi nerves of a rabbit, found a galvanic current of such a strength, which, when applied to the peripheral vagi trunks of the cut nerves, would restore and maintain the normal frequency of the cardiac beat; and he found after the injection of the amyl nitrite that the pulse-rate was not accelerated. Mayer and Friedrich found that in animals poisoned with amyl nitrite, the production of sudden asphyxia would not cause inhibition of the heart, as in the normal animal; and, further, that when the access of blood was cut off from the cerebral centres, the pulse was not quickened, as was the case in the normal animal. Pick (*Centralblatt f. d. Med. Wissens.*, No. 55, 1873) asserts that the increase is not only due to the depressed state of the inhibitory apparatus, but also to the effort of the heart in endeavouring to overcome the sudden dilatation of the arterioles, which allows such a large quantity of blood to pass through them as to require an unusual amount of work to be done by this organ. The conclusions arrived at by these observers are so confirmatory of each other, that it is but just to accept as a fact that the depression of the inhibitory apparatus is the prime cause of the increase. Here I find that the results of my own investigations are somewhat at variance with those given above, for, notwithstanding the fact that the increase still occurred after section of the vagi nerves, further experimentation has proven that this action is one directly on the heart muscle, for the increase was present after the isolation of the heart from the influence of the central nervous system, although this appeared to be not so great as when the vagi nerves alone were divided. The increased pulse-rate must then be due to both a direct action on the heart and possibly to a consentaneous depression of the inhibitory centres. It has been further experimentally proven that the force of the pulse is materially lessened from the first, as has been plainly shown in kymographic tracings. These show that the pulse is greatly increased, with a very small pulse-curve during the rise of pressure (see arterial pressure), and, after the rise has attained its maximum, the pulse becomes slower and the curves higher, and then again becoming more frequent and the curves smaller. It has also been found that the decline in the pulse-rate occurs after isolation of the heart from any centric nervous influence, showing that this also is a direct cardiac action.

Conclusion.—*Pulse.*

Potassium Nitrite: The pulse-rate is primarily increased, and secondarily diminished; the increase being due to a direct action on the heart and probably to a consentaneous depression of the inhibitory centres; and the decrease to a direct depressant action on the heart. The *force* of the pulse is diminished.	*Amyl Nitrite:* "The whole evidence seems to show that the . . . rapid stroke of the heart . . . is due at least in part to a depression of the inhibitory cardiac nerves. In the later stages of the poisoning . . . the heart-force itself being largely extinguished by a direct action of the poison on the muscle."

The *arterial pressure* is greatly affected from the first, and is differently influenced by various sized doses. Thus, it was found in dogs that large intravenous injections (.5–1 gram.) caused the pressure to fall immediately and progressively to zero, the animals, no doubt, expiring from cardiac paralysis, since the respirations continued for a few moments after the cessation of respiration, and as the autopsies revealed a diastolic condition of the heart attended with almost an entire absence of irritability. In cats and rabbits .2 gram. or possibly even less will produce an analogous effect. Much smaller doses will almost invariably cause a temporary rise of pressure, which lasts for about half a minute, this being followed by a fall, which if the dose be toxic, is progressive to zero. This was also the result observed in animals with cut vagi. In three cats, one with cut vagi, the rise of pressure after intravenous injection of .08 gram. was equal to about one-sixth of the normal, the rise lasting for about thirty seconds and being followed by a gradual but very marked fall, in one instance equal to one-third of the normal, and in the other two to zero. Consentaneous with the appearance of the change in pressure, both the respiration- and pulse-rates became very much increased in frequency. In a large dog with cut vagi nerves, to which an intravenous injection of .2 gram. was given, an appreciable rise of pressure occurred which lasted for about two minutes, and appearing in connection with this was an increase in the number and depth of the respirations, and an increase of the pulse with an appreciable diminution in the force. The pressure then began to subside, and fell equal to about one-tenth of the normal, when a second dose was given. The respirations then became greatly increased in depth and violently hurried, the pulse-rate was markedly accelerated and attended with a considerable diminution in the force, and the blood pressure arose equal to about one-half of the normal. After the pressure subsided and seemed fairly on the road to a progressive fall, a third dose was given which again caused a slight rise; the respiration-rate became fully doubly increased and panting; the pulse became slowed. The pressure then fell slowly and continuously for about six minutes, the respirations becoming slow and shallow and gradually sinking as death ensued. The result of this experiment is given somewhat in detail because of the apparent dependence of the rise of pressure upon the very marked changes which take place in the respirations, both in regard to the depth and frequency. It has, however, been found in experiments made on curarized animals in which artificial respiration was maintained, that a rise of pressure still occurred, independent of any respiratory action which obviously could not occur under these circumstances because the disturbing influences of the profoundly altered respirations were overcome. I have further found that after section of both the vagi nerves and the upper cervical spinal cord, the same changes in the arterial pressure were present, but the rise was decidedly more marked than it was in the normal animal.

The result of this last investigation seems to be confirmed by Brunton (*loc. cit.*), in his experiments with amyl nitrite. He found that although no rise of pressure occurred in normal animals, yet it sometimes occurred in animals in which the spinal cords were cut and aortas compressed, and amounted to about one-fifth of the normal. The difference in the results thus obtained by him thrusts upon us a question of considerable interest to decide, and if these results be accepted as accurate, which they justly claim to be since they came from such a reliable source, it shows at a glance that these changes in the arterial pressure are dependent upon a duality of action, and that the depression of pressure which was observed to occur in the normal animal at the first, supersedes a secondary action which was also present, but which was not apparent except in animals with cut cervical cords, and compressed aortas. The explanation of this complex action will be evident by studying the results of my own investigations with the potassium nitrite, and it will, therefore, be fair to reiterate some of my previous statements, that the principal points may be directly before us: first, it has been found that the arterial pressure is primarily increased, and secondarily diminished; second, that this increase and diminution still occur after isolation of the heart from the influence of the central nervous system; third, that the rise of pressure is decidedly more marked after section of the spinal cord in the upper cervical region, than it was in the normal animal; fourth, large intravenous injections cause an immediate and progressive fall of pressure to zero.

We have here, therefore, three prime facts: first, that the increase of pressure occurs after isolation of the heart from any centric nervous influence showing a direct action on the heart; second, that the decrease of pressure also occurs after isolation of the heart from any centric nervous influence, showing also a direct action on the heart; third, the rise of pressure is decidedly more marked after section of the cervical spinal cord than it is in the normal animal, indicating that the vaso-motor centres in the normal animal are so depressed that the vascular dilatation is able to overcome to a certain extent the stimulated action of the heart. It will, therefore, be plain that the reason why ordinary doses increase the blood pressure in the normal animal, is because the stimulated heart is able for a time to overcome the effect caused by the depressed vaso-motor centres, this conclusion being substantiated by the fact that the rise of pressure was even more marked after destruction of the vaso-motor centres (section of cervical spinal cord) than was the case in the normal animal; and the reason why the pressure falls for the first after large intravenous doses, is because the stimulant action on the heart is superseded, the organ becoming overwhelmed by the paretic action; and in this depressed condition associated with a similar depressed condition of the vaso-motor centres, of necessity the pressure must progressively fall. It was, however, asserted that the increased pulse-rate was associated with a diminished force, which might seem somewhat contradictory to the above statement that the heart was stimulated, but the fact that the action of the heart is able to overcome the vascular dilatation due to the depressed vaso-motor centres, is sufficient evidence to show that the increased frequency more than compensates for the diminished force.

It is now very easy to explain the diversity of the results obtained by Brunton, if we assume that the amyl nitrite acts in proportion more powerfully on the vaso-motor system than does the potassium salt, and, indeed, this assumption is clearly indicated to be a fact if we compare the action of the two salts on man, when we find that the amyl nitrite will cause an intense suffusion of the face within a few moments, while that observed after giving the potassium nitrite is not so intense nor is it so marked for a considerably longer period. The reason why Brunton did not get a rise of arterial pressure in normal animals was because the action on the vaso-motor system was so intense, that it was impossible for the increased action of the heart to overcome the dilatation of the vascular channels, which is clearly proven by the fact that the increase did occur when the vaso-motor centres were anihilated, and a great part of the dilatable vessels occluded by the compression of the aorta. Pick (*loc. cit.*) asserts that the accelerated action of the heart is in part a compensating one in endeavouring to overcome the action of the suddenly dilated arterioles, which allows of an augmented quantity of blood to pass through them, and hence of the increased cardiac effort. But this compensating action must be a very subsidiary one, since the pressure is so much increased above normal, and as it is certainly due to a direct stimulation of the heart, as has already been conclusively proven.

That the vaso-motor system is depressed I have experimentally determined by examining the web of a frog's foot under the microscope, and also the rabbit's ear, when it was found that distinct dilatation occurred. The dilatation of the arterioles caused by amyl nitrite has been noticed by Brunton (*loc. cit.*), Wood (*loc. cit.*), Amez-Droz (*Archiv de Physiologie Normale et Pathologique*, Sept. 1873), Aldridge (*West Riding Reports*, vol. i. p. 187), Pick (*loc. cit.*), Filehne (*loc. cit.*), and Schuller (*Berlin. Klin. Wochenschrift*, No. 25, 1874), all of whom found distinct vascular dilatation, but who are somewhat divided as to whether this action is centric or peripheral, or both. Brunton and Wood found a distinct dilatation occur even after section of the cervical spinal cord, when of course in all these instances the peripheral vaso-motor mechanism was absolved from any centric influence; and Schuller found that after section of the sympathetic nerve in a rabbit a dilatation still occurred. They therefore conclude that the vaso-motor dilatation is exclusively peripheral —a conclusion which is rather hasty and untenable, since it does not prove the absence of a depression of the centres, but merely shows that the peripheries are so affected. On the other hand, it has been found that by galvanization of the cervical sympathetic, the vessels in the rabbit's ear were capable of contraction, suggesting that the action must be centric; although this view is opposed by Pick (*loc. cit.*), who states that the explanation of it is that the arterioles are not so profoundly affected as to be incapable of responding to powerful stimuli. Filehne asserts that if the sympathetic nerve of one side of a rabbit's neck be divided, that the vessels of the uninjured side are to a greater extent dilated than are those of the injured side.

I think, therefore, in summing up the results of the above investigations, that the only proper conclusion is that both the centres and peripheries are depressed. In my own experiments on the vaso-motor system, it was found that in curarized animals the galvanization of a sensory nerve would not cause a rise of pressure so great as was the case before giving the potassium nitrite, and that by testing at intervals of a few minutes it was found that this diminution of effect was continuous and progressive, but gradually wore away as the animal recovered; or if the dose was toxic, continued diminishing till death. Further, it was found, as before stated, that after section of the cord in the upper cervical region, the rise of pressure caused by the stimulated heart was more marked than in the normal animal. Also, that the arterioles later in the poisoning do not respond to stimuli to the same extent as they do normally; and in repeating Filehne's experiment an identical result was obtained. This result was so evident that when an assistant was asked, "In which ear are the vessels the most dilated?" answered without hesitation, "The ear of the left side," which was the side with the sympathetic intact. It was also distinctly noticeable that the vessels were not in a state of continuous dilatation, but that a rhythmical alternate dilatation and contraction occurred, and that it was not until late in the poisoning that the vessels remained constantly dilated. I think, therefore, that the results of these experiments distinctly prove that the vaso-motor centres are depressed from the first, and that it is probable that the peripheries are not to a considerable extent affected until late, as the vessels do not appreciably lose their irritability until the system is profoundly under the toxic influence, and probably in therapeutic doses are practically unaffected, the vascular dilatation being alone due to a centric action, which is strengthened by the fact of the occurrence of the transient flushes occurring in man, and the alternate dilatation and contraction occurring in animals, as above noted.

Conclusion.—*Arterial Pressure; Vaso-Motor System.*

Potassium Nitrite: The arterial pressure is primarily increased, due to a direct action on the heart; secondarily diminished, due to vaso-motor and cardiac paralysis.

Vaso-Motor System: Both the centres and peripheries are depressed.

Amyl Nitrite: "It is evident that, at least in the early stages of the poisoning, the diminution of arterial tension must be due to dilatation of the capillaries. . . . . Very late in the poisoning the heart itself was acted upon.

"It seems to me established that nitrite of amyl does act locally on the coats of the arterioles, although it may at the same time influence the vaso-motor centres."

The *respiration-rate* in mammals is very much affected, and after the administration of small doses is increased from one-half to two-thirds more than the normal, while at the same time they are also somewhat increased in depth. If the dose be large or toxic they become exceedingly frequent and panting, gradually subsiding to the normal; or if the dose be lethal, they become slow and shallow, diminishing until death ensues. After large intravenous injections they are intensely affected, becoming exceedingly hurried, panting, and violent; or if the dose be sufficiently large, are almost immediately arrested. In experimentally determining the cause of the increased respirations, the vagi nerves in a number of animals were severed, and a tracheal tube inserted so that the paralyzed laryngeal muscles would not interfere with the breathing. As a result of these investigations it was found that the respirations were as markedly increased as they were in the normal animal, thus showing that the action of the drug must be that of a stimulant to the respiratory centres, although it is probable that this action is an indirect one because of the drug's asphyxiating action on the blood, of which we shall learn more hereafter. This result is identical with that obtained by other investigators with amyl nitrite (Mayer and Friedrich, *loc. cit.*). It was further found that after giving a toxic intravenous dose, as above stated, the frequent, deep, and panting respirations gradually subsided into those of a slow, shallow character, which gradually diminished till death. This fact at once suggests that this last respiratory change is due to a depression of the respiratory centres, which is substantiated by our knowledge of the effect of an injection of an extremely large dose directly into the centres, when it was found that the respirations at once ceased. Wood (*loc. cit.*) believes that the cessation of respiration is due to paralytic asphyxia. I think it therefore just to conclude that the respiratory centres are primarily stimulated, and that this stimulant action is probably an indirect one, being due to the irritant action of the asphyxiated blood on them; and that secondarily the centres are paralyzed, death being due to this last action, unless it be dependent upon cardiac paralysis.

Conclusion.—*Respiration; Death.*

Potassium Nitrite: The respiratory centres are primarily stimulated, which is probably due to the irritant action of the asphyxiated blood; and secondarily depressed.	*Amyl Nitrite:* "Mayer and Friedrich assert that at first . . . . increases by stimulating the respiratory centres, ... later [Wood] the respiratory centres are depressed."
Death is due to a paralysis of the respiratory centres, when not dependent upon cardiac paralysis.	"*Death* from a failure of respiration."

The *blood* is peculiarly affected, and in so far as gross appearances are concerned, is indistinguishable from the blood of amyl nitrite poisoning, which has been described by Wood (*American Journal of the Medical Sciences*, July, 1871), Joylet and Regnard (*Gaz. Méd de Paris*, 1876), Gamgee (*Philos. Trans.* 1868, p. 589) and others, as having a dark uniform venous colour and a distinct brownish or chocolate shade. Gamgee is the only investigator who has made any special study of this action on the blood, and his work is so thorough and elaborate that it must be accepted as correct. His experiments were not confined to the amyl nitrite alone, but embraced a study of nitric oxide and the potassium, sodium, and silver nitrites; and he finds that all of them act identically. A brief survey of his researches, which throw considerable light upon other physiological effects may be found in H. C. Wood's *Therapeutics.*

Dr. Wood (*loc. cit.*) says that "these researches have not, that I am aware of, been confirmed, but I think may be accepted as accurate. They do not, however, prove that the nitrite of amyl [or any other of the nitrites] entering the bloodvessel at once paralyzes the hæmoglobin of the blood-corpuscles and checks all oxidation. As already stated, the experiments of Dr. Gamgee showed conclusively that this new compound yields up its oxygen to reducing agents. Further, he found that when the nitrite blood was brought into contact with guaiacum-paper it still ozonized it, though not so actively as normal. It is evident that the blood-corpuscles retain to a greater or less degree their power of yielding up ozone to bodies desiring it; that they are capable of exerting at least this portion of their respiratory function; further, where this oxygen is given and the oxyhæmoglobin changed into hæmoglobin so far as our present knowledge goes, the hæmoglobin must absorb more oxygen before it can reunite with the nitrite. Evidently, then, absorption of oxygen must take place; evidently the blood-corpuscles must perform their respiratory function; but evidently, also, they are greatly crippled and impaired in the rapidity and ease of its performance. Hæmic respiration is, in other words, greatly interfered with, but not abolished."

And it therefore must follow that if the respiratory function of the blood be so seriously interfered with that the proper oxygenation of the tissues does not occur, and hence tissue metamorphosis must be checked. And, indeed, Wood further proves that the amyl nitrite must check tissue changes, because he found that the fumes of glowing phosphorus were completely extinguished by a few drops of the salt diffused in the air in the jar, and he therefore thinks that this checking of oxidation occurs within the body; further, that the elimination of carbonic acid was diminished; that the temperature was diminished; and because all the vital functions are depressed. Although I have no evidence of the action of the potassium salt on oxidizing phosphorus, or on the elimination of carbonic acid gas, yet I can testify to its marked action in diminishing the temperature, and to its general devitalizing influence exerted on the tissues.

Conclusion.—*Blood.*

The nitrites cause the arterial and venous to become of a uniform, dark venous colour, having a distinct brownish or chocolate shade, and that this is due to the conversion of the oxyhæmoglobin into a nitrite-oxyhæmoglobin; and that the nitrite blood possesses very little oxygen-absorbing power, and as a sequence hæmic respiration is seriously interfered with and tissue metamorphosis diminished.

The *temperature* record obtained after giving the potassium nitrite bears the same evidence of a profound action, as that obtained by experimentation with the amyl salt. Thus, Wood (*loc. cit.* p. 58) with amyl nitrite found in a pigeon the remarkable reduction of 14.5° F.; the average in the four experiments in these animals being about 7° F. In three normal mammals (rabbits and cats) the average fall was equal to about 4° F. Wood makes no mention in any of his records of ever having seen any rise of temperature occur; yet Langendorf (*Berlin. Klin. Wochenschrift*, No. 43, 1874) and Mastin (*Wood's Therapeutics*, 1879, p. 350) both found a distinct rise of temperature in man preceding the depression. The former observer states that the average rise was equal to about .5° F., and Mastin found a momentary rise which was thought to be due to vascular dilatation. In two carefully conducted experiments on dogs in which the rectal temperatures were taken and the thermometer retained during the entire course of the observation except the last hour or hour and a half, a distinct rise occurred which was followed by a fall, although on an average this was not so great as that observed by Wood with the amyl nitrite, and it is possible that this is to some extent dependent upon the size of the dose. In my first experiment, the dog weighing 18.75 pounds, and the dose being 3 gram., the maximum rise amounted to .4° F., reaching this point three and a half minutes from the time of hypodermic injection; this was followed by a slow, continuous fall, the temperature reaching the normal eight and a half minutes later, and then gradually sinking for fifty-two minutes, when it reached 1° F. below normal; oscillating at this point for three-fourths of an hour, it then gradually began to rise. In the second experiment, in which a gram. was given to a dog weighing 22.5 pounds, the maximum rise amounted to .15° F., occurring five minutes after the time of injection; one minute later it reached the normal, and then sank gradually for two hours, when it was found to be 3° F. below the normal, at which point the temperature oscillated for about one hour, and then gradually returned to normal.

The results of these two experiments are given somewhat in detail because of the great interest centred in them, for in looking over Wood's experiments it seems apparent why he never noticed any rise occur, because he made his observations at relatively long periods after giving the doses, and in only one or two (?) instances was an observation made early enough to record any rise, and in one of these experiments (No. 36) the nitrite was given by inhalation, and the first record made one minute after administration showing the temperature unchanged; and in experiment No. 34, ten minutes after injection "into [the] breast," the temperature was "not as yet materially affected," it appearing probable from this that the thermometer was retained in the animal and watched. It also appears from the results of my own experiments above recorded, that the relatively smaller doses are more potential in causing the rise than are the larger ones, this corresponding to what has already been noticed by Langendorf (*loc. cit.*) in his experiments on man. It seems probable, as before suggested, that the rise was due to vascular dilatation, because it has been found that the potassium nitrite undoubtedly possesses the same power as the amyl nitrite in diminishing tissue metamorphosis. That the rise of temperature was not so apparent after the larger doses, was no doubt because the effect of the vascular dilatation is overshadowed by the more pronounced action present in causing the depression. Wood states that the amyl nitrite causes a diminution of temperature because of an arrest or checking of tissue change, and in corroboration of this statement has experimentally determined that the depression is associated with a diminution in the elimination of carbonic acid, and further that if tissue metamorphosis is arrested, it must be associated with a general depression of all the functions, and this he asserts is actually shown to be the case, no matter in what way the drug may be exhibited, and being very decidedly manifest from the results of local applications, when it was well shown that the rapidity and completeness of the loss of function depended upon the amount of the adulteration of the poison. He further states his belief in the association of the central nervous system in the production of the depressed temperature. It has already been shown that potassium nitrite is a deoxidizer, and that the vital functions are depressed, and therefore if such is the case, there must be a diminution in the elimination of carbonic acid. That the nervous system is intimately associated with the diminished tissue metamorphosis in the production of diminished temperature, I have experimentally proven in three calorimetrical experiments with the potassium nitrite, in which it was found that heat dissipation was increased about two per cent. over heat production.

Conclusion.—*Temperature.*

Potassium Nitrite: The rise of temperature is due to vascular dilatation, and the fall to diminished tissue metamorphosis and an increased dissipation of heat. Heat dissipation is increased about 2 per cent. over heat production.	*Amyl Nitrite:* "Rise of temperature . . . . evidently dependent upon vascular dilatation [and the fall of temperature] to a direct arrest or check of tissue changes or oxidation . . . . acts directly on the nerve-centres independent of its influence on the blood."

The functional activity of the *skeletal muscles* is impaired and ultimately abolished, although this last condition is never observed to occur previous to death, unless it result from a local application of the drug in a concentrated form for it has already been found that the skeletal muscles are the last portions of the motor system to succumb. In experimentally determining that the muscles were depressed, frogs were taken and the gastrocnemii muscles exposed, one of them was then painted with a solution of the potassium nitrite, and the other kept moist with salt water. After an interval of a few minutes it was found by comparing the two with an electrical current that the poisoned muscles rapidly lost their contractile power, and finally became completely paralyzed, although the uninjured muscles still retained their normal activity. The poisoned muscles also presented a pale appearance as compared with the others, but the reason of this I am unable to explain. Details of investigations, when the drug has been administered through the medium of the circulation, have been given in previous pages.

Unstriated muscular tissue, excepting the heart muscle, is not as depressed as the skeletal muscles, although they are to a slight extent, as is shown by testing the muscular contractility of the intestines. The *heart*, unlike any other of the muscles, is primarily stimulated and secondarily depressed, for it was found, when it was isolated from the central nervous system in the mammal or excised in the frog, that when the drug came in contact with it, the pulsations were increased, and if the dose was sufficiently large, they subsided below the normal and finally ceased ; the heart being arrested in diastole, remaining full of blood, and scarcely, if at all irritable. It has also been proven that in mammals both the diminished pulse rate and arterial pressure were due to cardiac depression. It has also been found that if the heart of the frog was excised, and a few fragments of the crystals placed on the ventricles, in a few minutes, the portions of the ventricles on which the crystals were placed became pale and depressed, and that when the ventricles ceased pulsating they remained in a pale systolic condition, although the auricles continued beating for a time, and were finally arrested in diastole, presenting a marked contrast when compared with the pale, systolic condition of the ventricles. This was evidently due to the strong local irritant action of the drug, since it only occurs after a local application of the drug in a concentrated form.

Conclusion.—*Muscles ; Heart.*

Potassium Nitrite: The *skeletal* muscles are depressed and finally paralyzed. The *unstriated muscles* are depressed. The *heart* is primarily stimulated, and secondarily depressed.	*Amyl Nitrite:* "After death the muscles preserve, though in an impaired condition, their functional power."

Absorption takes place very readily by any of the highly organized tissues, whether the drug be given by the stomach, hypodermically, or when locally applied. When placed in contact with the cutaneous surface an instance of the rapid absorption was well shown in frogs which had been placed in a saucer with a small portion of the solution in contact with their abdominal walls, when it was found that they jumped about violently for a few moments and then became quiet, passing into a narcotic condition which was followed by convulsions and death. Precaution was taken during the above observation to note that none of the solution was swallowed. Numerous instances of the very ready absorption by the different tissues have already been given.

Conclusion.—*Absorption.*

Potassium Nitrite: Absorption takes place very readily by any of the highly organized tissues.	*Amyl Nitrite:* "Can be absorbed by any surface except the skin."

The identity of the physiological action of the potassium and amyl nitrites has been so clearly demonstrated by the above investigations, that I was induced to make further experimental studies with the sodium nitrite. These investigations have not been carried out to such completion as to enable me to positively assert that its physiological action is the same as that of its predecessors, yet so far as these studies have gone—being confined entirely to the general action, circulation, and nervous system—the results all most positively indicate that its action is in all particulars parallel to that of the other salts. In looking over the literature of the nitrite, I have been unable to find any papers on the physiological action of any of the salts except the papers which have already been quoted on the amyl nitrite, and a single paper on the general action of ethyl nitrite by Richardson (*Brit. and For. Medico-Chir. Rev.*, July, 1867, p. 259). In comparing this last observer's results with the results of the above investigations made with the amyl and potassium salts, a remarkable similarity in the physiological action is very apparent, and indeed Richardson in his paper makes note of the close analogy with the amyl salt. In the human subject he found suffusion of the face, fulness and throbbing in the head, a frequent pulse, and rapid, panting respirations. In the lower animals it was found to be in no degree anæsthetic, sensibility and consciousness being maintained to the last; the arterial blood was found to be of a peculiar chocolate tint; and the animals after inhaling lethal doses died of a failure of the heart, or from a sudden cessation of both the pulse and respiration.

This brief review of Richardson's results is sufficient to show that the action of the ethyl nitrite is essentially that of the other salts, and the remarkable identity of the action of all of them when thus compared, at once suggests that their peculiar physiological properties must be dependent upon some one constituent entering into the composition of each and all of them, and it must be apparent that this one principle upon which this unity of action depends is *Nitrous Acid*. It is therefore fair to assume that all nitrites possess these distinctive physiological properties, which vary, however, in the rapidity, permanency, and potency of action, according to the base with which the acid is associated. In order to indisputably prove that these recognized properties of the nitrites are dependent upon the nitrous acid entering into their composition, it was intended to pursue a physiological investigation with the acid itself, but upon carefully studying the subject, such an investigation was found to be impracticable on account of the peculiar chemical properties of the acid, as it becomes very rapidly decomposed when brought in contact with water, or when subjected to a temperature of a few degrees above freezing point.

LABORATORY OF EXPERIMENTAL THERAPEUTICS,
UNIVERSITY OF PENNSYLVANIA, May, 1880.

ARTICLE XII.

CERTAIN TRAUMATIC LESIONS OF THE BONES OF THE ORBIT, WITH CARIES AND PERFORATION.

By CHARLES STEDMAN BULL, A.M., M.D., Surgeon and Pathologist to the New York Eye Infirmary.

CONTUSED or lacerated wounds of the margin of the orbit and immediate vicinity often cause serious results, among the most frequent of which are lesions of the supraorbital or frontal and infraorbital nerves, leading either to chronic neuralgia of the nerves and their branches, or to sudden blindness, either partial or complete. These results, being by no means uncommon, occur in the experience of the general practitioner, and therefore need no further reference. But wounds of this nature often cause inflammation of the periosteum and subjacent bones which may end in a carious process. Sometimes this does not immediately follow upon the injury, and the wound through the skin may slowly close and some time elapse before the signs of bone-disease develop. Though the death of the bone does not always follow these injuries, yet periostitis is the common result; and though the inflammatory process is generally localized, it may extend superficially as well as into the substance of the bone. The immediate consequence of a wound in this region is a rapid and marked swelling of the neighbouring soft parts, caused by extensive infiltration, and mainly into the eyelids, so that they cannot be opened; and this often renders it impossible during the first few days to tell whether the eye is injured or not. After the subsidence of the swelling the wound through the soft parts closes and all signs of the injury subside, unless inflammation has been started in the periosteum and bone, or the bone itself has been injured by the accident. If the latter, still the wound may close and then reopen, owing to a collection of pus upon or beneath the inflamed periosteum. When such an abscess forms and opens externally, it almost always results in a fistula, and the sinus is found to lead down to carious bone.

Fracture may result from these injuries, though this is rare, except in the ascending process of the superior maxillary bone. Fractures of the orbital plate of the frontal bone or in the inner wall of the orbit, involving the lachrymal and ethmoid bones, are occasionally met with, but here the injury is almost always the result of perforating wounds by direct thrust from some sharp or blunt-pointed instrument, and the bone itself is perforated. The danger from such wounds cannot be overrated, and one of the cases to be reported exemplifies this fact very markedly. Where the fracture involves the roof of the orbit, especially if there is a direct lesion of the bone caused by the instrument, the patient should be watched very carefully, and an unfavourable prognosis given. Injuries to the superior orbital margin or its vicinity, which do not involve the roof of the orbit, are, on the contrary, often borne very well, even when caries is the result, especially in children, and this is true of pistol-shot wounds as of other injuries in this region. One of the cases which follow is an example of such an accident, in which the pistol ball remained imbedded for several months in the frontal bone, causing caries of the bone and an open sinus. Indeed, children seem to bear injuries of the soft parts and bones in this region exceedingly well. The reports of four cases which follow illustrate both the common and the rare forms of injury to the bones of the orbit, two of them being types of bone caries, and the others of perforating wounds of the bony walls, which opened into neighbouring cavities.

Case I. *Lacerated Wound of Supraciliary Ridge and Orbital Margin.* —Patient was a boy, æt. 2; first seen January, 1878. Two months before, the child had fallen against the sharp angle of a box, and had received a wound along the orbital margin and supraciliary ridge, which had been about half an inch long. There was profuse bleeding at the time, and the neighbouring parts became rapidly swollen and discoloured. The lids were completely closed, densely infiltrated, and there was a great deal of pain. No physician was called in, and no special treatment had been carried out, except the application of cold water. The child at no time manifested any cerebral symptoms, but, after the subsidence of the swelling, the wound remained open, and there has been a more or less abundant purulent discharge ever since. On examination there was found a narrow fistulous opening through the skin and tissues of the left eyebrow at the junction of the middle with the outer third. This opening led down to the bone; the tissues immediately around it were retracted, sunken, and bound down firmly to the bone, and were covered by a thin yellow scab. There was no swelling around the fistula, but there was some tenderness on pressure. A probe introduced through the opening touched dead bone at once, and towards the median line could be pushed to the distance of half an inch, grating upon a roughened surface all the way, and apparently passing into a cavity, which would have represented the frontal sinus in an adult. Judging by the probe, the denuding of the bone from periosteal inflammation had not extended upwards much above the point of injury; but downwards, the probe passed along the orbital margin, and at one point passed beneath the arch into the cavity of the orbit, grating against roughened bone all the way. There was slight ptosis, but the child had apparently full power over the levator palpebræ muscle.

The child was etherized, the skin was made tense over the part by pulling the eyebrow upward, and a horizontal incision, an inch and a half long, was made parallel to the orbital margin, from just above the root of the nose outwards. The incision was carried through all the tissues down to the bone. After the bleeding had ceased, the lips of the wound were retracted, and a careful examination made of the bone. The periosteum was found either absent or diseased over a space about an inch long by half an inch wide, and the bone was roughened and carious for a corresponding space, involving the orbital arch, but not extending up on the forehead. Towards the inner end of the wound the carious process had extended more deeply into the bone, and here was a small cavity with several loose spiculæ of bone. By the aid of a stout pair of toothed dressing forceps and a sharp steel scraper, in shape something like a hoe, the cavity was cleaned out, the roughened and dead bone scraped off, and a freely-bleeding surface left, from which it was hoped fresh granulations would spring up. The wound was then washed out with a one per cent. solution of carbolic acid, and filled loosely with borated cotton.

The case did well from the beginning. The dressing was repeated twice a day at first, as the purulent discharge was considerable; but later the wound was dressed only once a day. The cavity filled from the bottom with healthy granulations, and in three weeks from the operation the wound had entirely closed, the ptosis had almost disappeared, and the child was discharged from further treatment.

Case II. *Pistol Shot Wound of Orbital Ridge and Margin.*—Girl, æt. 4, first seen in April, 1879. The mother said that five months before the child had been accidentally shot in the forehead just above the left eye, with a toy-pistol. The child fell, but did not lose consciousness. The wound bled very little, but there succeeded very violent inflammation of the soft parts, characterized by great swelling and redness, and the child cried constantly. A physician was summoned, who probed the wound, but could not find any ball, and then ordered poultices to be constantly applied. After about four weeks the active inflammatory symptoms subsided, and the child has not complained of any pain since then, but there has been a constant purulent discharge of offensive odour from the wound, and the mother states several small particles of bone, like grains of sand, have come away. An examination showed a fistulous opening through the tissues at the orbital margin near the inner end of the eyebrow. The opening was retracted and its lips pouted, the tissues around it for some distance were firmly adherent to the bone, and there was a moderate amount of ptosis. The orbital margin and tissues over it were thickened, and thin pus oozed from the fistula. A probe introduced, passed along a fistulous tract inwards toward the nose, and downwards along the orbital margin, touching roughened bone along its course. The carious process did not seem to extend outward towards the temple beyond a very slight degree. In pushing the probe inward, a point of bone was felt that appeared to be very loose, and here there seemed to be a small cavity into which the probe entered.

The child was etherized, and a horizontal incision was made parallel to and just above the orbital margin, extending from the median line at the root of the nose to a point at the junction of the inner with the middle third of the eyebrow. The incision was carried through all the tissues, including the periosteum, down to the bone. The bleeding was quite free, and seemed to come quite as much from the bone as from the soft tissues. After it had been somewhat checked a careful examination was made of the diseased bone. The periosteum was in places entirely absent, in others perforated by a number of small openings. Several small grains of dead bone were removed with the finger, and the bone was then scraped smooth with the instrument used in the first case. At a point midway between the ends of the incision was seen the opening of another fistula, and here was a small spicula of bone projecting, which was movable. The opening was enlarged by a strong pair of dissecting forceps, and then the small sequestrum was removed. Its removal left a small cavity, pointing towards the median line, with something dark at the bottom. After one or two fruitless attempts to grasp this, it was seized with a pair of sharp forceps and brought out and proved to be the pistol ball, about the size of a small buck-shot, somewhat roughened and eroded. The cavity was then washed out, carefully scraped clean, and again syringed, and when examined proved to be fully a quarter of an inch deep, and extended towards the median line. This case was treated exactly as the preceding one; the cavity was washed out twice a day with a one per cent. solution of carbolic acid, and then filled loosely with borated cotton. The reaction from the operation was quite severe, and the parts swelled ominously, but a careful and constant application of cold cloths, and keeping the wound open, soon caused these symptoms to give way, and the process of repair and filling up of the wound went on in a satisfactory manner. At the end of the fifth week the wound had entirely closed over and cicatrization began. The tissues have since become firmly adherent to the bone, and there is a tendency to a retraction of the scar, so that it may be necessary later to detach the cicatricial mass from the underlying bone and maintain the separation of the two surfaces until each has healed over. This of course must be done subcutaneously, the object being to allow greater freedom of motion to the skin and subcutaneous tissues. The ptosis, which has remained about the same as before the operation, would probably also be improved by this detachment of the cicatrix, provided it could be so maintained.

In both these cases, though the degenerative process in the bone had lasted two and five months respectively, the periosteum overlying it was not entirely destroyed. It was perforated by numerous openings over a somewhat circumscribed area, and its condition partially concealed by the fleshy granulations which covered its surface and also by the sinuosity of the fistulous channel. The circumstances account for the fact that it is not always easy to recognize the extent of the carious process in these cases, and sometimes not even its precise situation.

The bone disease in this region, according to the statements of authorities, consists in a slow molecular destruction, so that the detritus is finely granular and concealed more or less by the purulent discharge. It is rare to find sequestra of any size, and the elder *Sichel*, whose experience in this disease was quite extensive, never met with a case in which a piece of dead bone was so large as to require removal by the forceps.

The adhesion of the lips of the fistula to the underlying bone interferes with the free movements of the soft parts, and if this adhesion of the soft parts extends for some distance beyond the fistula, it may interfere with the movements of the lids and even lead to ectropium. The latter danger is especially liable to occur in the lower lid.

In the second case, where the original injury had been caused by a pistol shot wound, it was impossible to obtain any exact information from the patient's family as to the manner in which the accident happened. But the shot must have been fired from some distance, as the ball was of such a size as to have perforated the frontal bone and entered the cavity of the skull, if the pistol had been discharged near the patient. As it was, the original injury together with the resulting caries produced such destruction of bone tissue as to come uncomfortably near the cranial cavity.

CASE III. *Pre-lachrymal Abscess: Caries and Perforation of the Lachrymal Bone of Traumatic Origin.*—Boy æt. 14, first seen Sept. 1,

1879. About four months before he had received a blow from the end of a cane at the inner angle of the left eye, which lacerated the skin and caused a free hemorrhage. The parts swelled and became very much discoloured; but cold applications reduced the swelling in a few days, the wound healed in the skin, and nothing more was thought of the injury, until the boy began to complain of a dull pain along the side of the nose and inner angle of the upper lid, and a swelling began to appear in the same region. This increased somewhat rapidly in size, the skin became very much thinned and distended, and finally the abscess broke, and a large quantity of pus was discharged. This occurred about a month after the injury, and a purulent discharge has continued ever since, a period of three months.

When brought to the writer for treatment, there was a swelling about the size of a hazel-nut at the inner angle of the orbit and side of the nose, the skin was somewhat reddened over it, and there was a small fistula through its anterior wall, from which there could be pressed out a small quantity of thin pus. The swelling involved the inner end of the upper lid, and was limited below by the internal canthal ligament. It was slightly resistant, but could be pressed back against the bony wall without much force. When the pressure was removed the swelling returned, as if its cavity had been refilled; and as very little pus could be evacuated, it seemed possible that a volume of air kept the cavity distended. A probe was introduced through the fistula, and almost immediately struck dead bone, and on passing the head of the probe over the roughened bony surface it suddenly slipped into a somewhat deep cavity, which seemed to have large dimensions. A diagnosis was made of caries of the lachrymal bone, and possibly also of the ethmoid bone, with a defect in the bones, which was either the direct result of the injury or a secondary result of the carious process, with the probabilities in favour of the former view. It was decided to make an exploratory incision through the external swelling down to the diseased bone, in order to determine how far the diseased process extended. The patient was etherized, and a straight incision made across the swelling a little to the nasal side of its vertical diameter reaching from the orbital margin of the frontal bone down to the internal palpebral ligament. The subcutaneous connective tissue and fascia were found very much thickened, and the contained cavity of only small dimensions. After the free hemorrhage had been somewhat checked, the cavity was washed out with a one per cent. solution of carbolic acid, and the lips of the incision being held apart by retractors, a large hole was found at the bottom. This hole pierced the lachrymal bone just behind the crest, was irregularly circular in form, and about a third of an inch in its longest diameter which was horizontal. It involved the orbital plate of the ethmoid bone, and opened into the ethmoid cells. A probe introduced through the hole, having been previously bent upon itself nearly at a right angle, passed inwards and backwards without meeting with any obstruction. When pressed downwards it passed easily for about half an inch, but was then arrested by a firm bony obstacle. An attempt was made to pass a drainage wire from an opening in the lachrymal bone into the nose, but failed. Further interference was deemed unadvisable at that time, and the hole and cavity being carefully syringed out with the same solution of carbolic acid, the wound was loosely filled with borated cotton, and the patient allowed to recover from the anæsthetic. There was very little reaction from the operation, but when the wound came to be dressed on the next day, the patient complained that the fluid used in washing out the cavity ran down into his nose, and that he could taste the carbolic acid. The solution was then changed to one of borax, a drachm to the quart of water; and when the patient sat up in bed the fluid could be seen slowly trickling from the nose, showing that the cavity in the ethmoid cells communicated with the nose.

The purulent discharge from the wound was not very marked, and the cavity leading down to the hole in the lachrymal bone has slowly contracted, but there is apparently no attempt as yet at closure of the bony defect. When the patient expires with closed nose and mouth. air and mucus are forced out of the hole, but only in small amount. This shows that, though a communication exists with the nasal cavity, it is not a direct one, and probably not a large one. At the present writing, three months and a half after the operation, there is a small fistula leading down to the hole in the lachrymal bone, which is somewhat nearer the orbital margin than the opening before the operation was. There is also a slightly retracted appearance of the cicatrix, but not enough to interfere with any movement of the upper lid. There has been no purulent discharge from the opening for a number of weeks, and only occasionally does a drop or two of clear, watery fluid exude from the fistulous tract. There is no deformity; the scar of the operation is almost invisible, and it has seemed to me best to leave the case as it is, without any further interference, unless something unforeseen should occur.

In this case there was never at any time any interference with the passage of the tears from the conjunctival cul-de-sac to the cavity of the nose, showing that the disease was not in the tear passages. This prelachrymal abscess connected with the carious bone at the bottom, might have been mistaken for an abscess of the lachrymal sac, if examined carelessly. But the fact that there was no obstruction to the flow of tears into the lachrymal sac, together with the other fact that the swelling was above the internal palpebral ligament, and a little external to the region of the lachrymal sac, rendered the diagnosis certain. Another point against its being anything like dacryocystitis was the small amount of pain experienced by the patient, even on pressure, and the absence of all the usual signs of acute inflammation.

Very recently there have been reported two cases of this rather rare accident by Dürr in the *Klinische Monatsblätter für Augenheilkunde* for September, 1879. The case occurred in a man æt. 40, who, fourteen years before, had received a blow from the point of a rapier at the internal angle of the orbit. There was a hard, firm tumour above the internal palpebral ligament. After opening it, nasal mucus flowed out, and a round hole, six millimetres wide, was seen in the lachrymal bone. The case was treated by syringing, cauterization, and the introduction of a drainage tube through the hole into the nasal cavity, and eventually the defect in the lachrymal bone entirely closed, though the external fistula remained.

The second case was in a man, æt. 62, who had been wounded thirty-four years before by a foil in the inner angle of the right eye. The swelling had made its appearance only eight months before, and was limited below by the internal palpebral ligament. By firm continued pressure the tumour could be made to disappear. A hole could be felt in the bones through the skin, involving the orbital margin of the frontal bone as well as the lachrymal bone. It was a rounded oval, its horizontal diameter being 1 cm. long, and its vertical 12 mm. No operation was attempted in this case.

Case IV. *Lacerated Wound of Upper Lid and Orbit; Perforation of Orbital Plate of Frontal Bone; Meningitis; Death.*—The little patient was a boy, æt. 18 months, and was first seen by the writer in April, 1878. On the previous day, while tottering along the floor with a wooden clothes-pin in his hand, he stumbled and fell, striking with the left eye upon the pronged end of the clothes-pin. There was some bleeding from a wound in the lid, but nothing of an alarming character. The child cried all the rest of the day and part of the night, but towards the morning of the next day he became quiet, and remained in a somnolent condition until I saw him, making no noise or complaint except when disturbed. When called to see him, he was lying on his mother's lap, perfectly quiet, with blanched face, bloodless lips, and a very thready pulse; but when any movement was made to disturb him, he gave vent to a whining, fretful cry, which lasted until again left undisturbed. The eyelids were much swollen, particularly the upper one, and discoloured from extravasated blood. About the middle of the upper lid was a small lacerated wound, through which projected some orbital fat, and from which oozed a thin, bloody discharge. It was impossible to open the lids, owing to their infiltrated condition, and hence the state of the eye could not be ascertained. The projecting mass of orbital adipose tissue was carefully pushed back through the lid, and a probe was then introduced and passed back into the orbit for about half an inch. At one point in the roof of the orbit a rough object was felt, which gave the impression of a foreign body, and the condition of the clothes-pin was then inquired into. The mother could not tell whether a piece had been broken off or not. The wound in the lid was then enlarged, and a pair of forceps introduced, in order, if possible, to grasp the supposed foreign body and remove it. With the forceps the same rough object was felt, but a doubt was raised whether it was not the edge of a fracture in the orbital plate of the frontal bone. Nothing distinctly protruding into the orbit could be felt, and in view of the extreme delicacy of the bones in this region in so young a child, it was not deemed advisable to extend the operation any farther. The parents were warned of the dangerous nature of the accident, and of a probable fatal termination. The next day the somnolence deepened into semi-coma, the pulse became very slow, the surface of the body clammy, and the pupil of the other eye contracted. These symptoms became more marked, the coma became profound, the pupil dilated, and death resulted on the fifth day. I omitted to state that at the time of the examination of the wound, no loose bone was anywhere discovered.

The *post-mortem examination* showed extensive serous effusion under the arachnoid, and in the meshes of the pia mater, all over the convexity of the left hemisphere, and at the base. The ventricles were somewhat distended, though not markedly so. The base of the left anterior lobe was the seat of an abscess, about as large as a walnut; and there was extensive meningitis, reaching back nearly to the occipital lobe on the left side. When the brain was removed there was uncovered a ragged hole through the roof of the left orbit, about midway between base and apex, which connected with the opening in the lid, as a probe passed through the lid entered the cavity of the skull through this hole. There was no trace of any foreign body, though it was carefully looked for. One of the prongs of the wooden clothes-pin had evidently fractured the vault of the orbit, and had entered the cavity of the skull, causing meningitis and abscess of the anterior lobe. The pin had not been broken off in the skull, but had been withdrawn entire, thus leaving the wound uncomplicated.

Of course, the roof of the orbit, from its situation and extreme thinness, is especially liable to such injuries. The external wound in this case was of trifling extent, and in itself would have excited little suspicion of danger. There was very little hemorrhage, most of which seemed to come from the lid; for when the skull was opened, and the brain removed, there was no blood in the cranial cavity, and scarcely any in the orbital tissue.

There were no convulsions in this case, and no symptoms appearing in the eyes, except the change in the size of the pupils.

A careful examination was made of the orbit, but there was no foreign body to be found, though there was considerable infiltration of the tissues by plastic effusion.

These perforating wounds of the orbital walls are serious, and when the roof is fractured, death usually results.

47 EAST TWENTY-THIRD STREET, Jan. 15, 1880.

ARTICLE XIII.

ON VACCINATION. Communicated by WALTER F. ATLEE, M.D., of Philadelphia.

IN the number of the *Practitioner* (London), for January, 1880, is an article by Henry Stevens, M.D., of the Medical Department of the Local Government Board, entitled "On the Supposed Deterioration of Humanized Vaccine Lymph in this Country, *à propos* of the question of 'Animal Vaccination.'" In this article Dr. Stevens says that he believes that he has examined more vaccinated children than any man alive or who ever lived. He finds no ground whatever for the suspicion that the present arm-to-arm lymph has lost its true and original Jennerian character. He denies it altogether. He says: "I can positively state that, examining dozens of recently vaccinated children every day of my life, and that during a long series of years, I find no ground whatever for the suspicion that the present arm-to-arm lymph has lost its true and original Jennerian character. I do not believe that our arm-to-arm lymph affords any less protection than it ever did." He says, moreover, that it was his duty to inquire into nearly all the complaints of the untoward results of vaccination, and can state most positively that he never found in any one single instance any ground whatever for these allegations against vaccination.

I wrote to my father, Dr. Atlee, of Lancaster, of these statements of Dr. Stevens, and in his answer he says: "I fully agree with Dr. Stevens that there has been no deterioration in the vaccine virus, nor in its effects, from the time of my experience with it, which has now been sixty-four years. While a student in 1818–19, the varioloid made its first appearance after the introduction of vaccination, and I was then extensively engaged in vaccination and re-vaccination. I studied the *disease* and its effects, so far as the pustule was concerned, with extreme care, and I *now* find no difference in its appearance or in its preservative effects from what they were at that time."

My father adds: "I have in almost all instances used the crust. Sometimes have punctured the vesicle and taken the lymph on glass. In a few, very few, instances among the thousands I have vaccinated, taken from arm to arm. But I never could perceive any difference, and I believe that one is no better than the other, each producing all the well-marked diagnostics of genuine vaccine pustule.

"I have tested the efficacy by inoculating for smallpox after vaccination; have taken patients after vaccination to cases of malignant smallpox in small and hot stove rooms, and exposed them to the foul atmosphere for fifteen or twenty minutes, secure from danger. In one case of a mother with six unvaccinated children, one at the breast, who had a severe attack of smallpox, as soon as I discovered the nature of the case, I vaccinated all the children from a vaccine-crust, and they all took the vaccine disease. The room—it was in February—was a small ten-by-twelve feet room, with a hot ten-plate stove, and but one bed, on which they all slept, and which was saturated with smallpox contagion; yet these children picked off the scabs from their mother's body, and the baby nursed at her breast, and no one took the smallpox. Had I time this morning I could multiply instances of a similar kind. I have the utmost confidence in the protective power of vaccination, and I feel very sure that the cases of failure are very much more attributable to the use of vitiated vaccine matter; to the ignorance of unprofessional persons as to the purity of the virus, who have practised vaccination; and, in my experience, to the carelessness of physicians themselves as to the condition of the patients vaccinated, when affected by hepatic or other eruptions, than to any inefficiency of genuine vaccination."

"I have been very careful myself, and have enjoined it upon my students and younger professional brethren, never to use a crust taken from an *unclean* child; nor, unless the extreme urgency of the case demanded it, to vaccinate a child affected by any eruption. It is the only way in which that foul disease, smallpox, can be exterminated."

Article XIV.

Carbuncle of the Face. By F. A. Burrall, M.D., of New York.

The face is not a usual seat of carbuncle, but when occurring there it assumes features of more than ordinary interest, and requires prompt and careful attention. The lip is generally but not always the part affected. Bryant[1] says that the disease "was probably first described by a clever young surgeon, Harvey Ludlow (*Med. Times and Gazette*, Sept. 1852), and M. Reverdin, interne des hôpitaux, has given an elaborate essay on the subject in the *Archives Générales de Médecine* of August, 1870. These are his conclusions:—

"1. Anthrax and carbuncle of the face present a special gravity.

"2. This gravity is due to the ready complication with phlebitis.

"3. The facial phlebitis is attended with death, either by extension to the sinuses of the dura mater, or by becoming the source of purulent infection.

"4. Of anthrax of the face, that of the lips is more frequently complicated with phlebitis than the others. This may be explained by the peculiar texture of the lips.

"5. Anthrax of the lips has nothing in common with malignant pustule.

"6. The involving of the orbit in the phlebitis, as demonstrated by exophthalmia, shows almost certainly the implication of the sinus.

"7. Incision, speedily and extensively performed, seems to be the best means of preventing, and sometimes of arresting the phlebitic complications."[2]

Billroth writes:—

"Unfortunately, I have had such sad experience in these carbuncles of the face, that in any affection of the kind I am very solicitous about the life of the patient."

Thus much by way of preface to a case of this disease which I attended last year, and which, apparently of minor importance in its commencement, caused me much anxiety during its course.

Case.—Jan. 28. I was called to see Mr. A., an American, 20 years of age, a clerk, somewhat delicate in appearance, and of strumous antecedents, and was told that he had not been feeling well for some time. He had had a chill on the 24th, and woke up saying that his face was "all swollen up." Pulse 88, temp. 100°. There were one or two acne-like pustules near the left angle of the mouth. The constitutional disturbance being only moderately severe, I ordered the tincture of muriate of iron internally, and externally the lotion of lead and opium.

29*th.* The swelling of the left side of the face, which had been slight, has increased. Pulse 86–88. As there had been no movement from the bowels, an injection was ordered. The intellect is clear. Poultices of flaxseed were substituted for the lotion of lead and opium.

30*th.* There is a longitudinal swelling like the half of a date-pit running downwards and outwards from the left angle of the mouth, which I incised, and found carbuncular. Pulse 96, temp. $104\frac{1}{2}$. I changed the dressings, substituting oakum wrung out of warm water and covered by oiled silk, the parts being also smeared occasionally with Peruvian balsam. Patient ordered to take as much milk as possible, and beef-tea occasionally. P. M., pulse 106, temp. 104. The chin is flecked with small pustules, and is very tender and brawny, as is also the left submaxillary region, which is swollen, as if from glandular enlargement.

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[1] Practice of Surgery, Phila., 1879, p. 136.

[2] Ibid.

31st, A. M. Patient passed a restless night. Has diarrhœa. Pulse 104, temp. 103. The swelling is somewhat less, and the incisions permit the exit of discharge. P. M. Pulse 109, temp. 105. The left two-thirds of the lower lip being infiltrated with caseous material, I drew a bistoury through the lip laterally, posterior to the vermilion border. Little hemorrhage followed, but he felt relieved. Some diarrhœa. He has been taking ten-drop doses of Squibb's liq. opii comp. p. r. n. to relieve his discomfort and quiet his nervous system, which is very irritable. As he has some pain in the chest, I examined the right side, but detected no unusual respiratory sounds. Urine showed a dense pinkish sediment, and an acid reaction. Spec. gravity, 1030. No albumen, no glucose (Moore's test), no phosphates. The microscope revealed urates. Continue treatment.

Feb. 1, A. M. Pulse 96, temp. $103\frac{3}{4}$. Had a temporary delirium (the brain is naturally excitable), accompanied by an hallucination. The swelling is less. He had three or four passages during the night. At 2 P. M. I found the lip and face presenting the usual tumefaction. Several lines of lymphatics, distinct by their redness, ran along the anterior portion of the throat to the upper part of the chest. These and the throat I painted with tincture of iodine, and afterwards applied it to the chin. Ordered quinæ sulphat. gr. xxiv, acid. sulph. dil. gtt. xxxvj, syrup. limon. ℥ij. M. S. ʒj every three hours. Continue tinct. ferri muriat. P. M. Pulse 116, temp. $103\frac{1}{2}$. Continue treatment. I also directed a cloth wet with a solution of carbolic acid (ʒj–Oj) to be laid upon the lower lip to protect the upper from it. There has been a constant expectoration of tough mucus. Patient takes nourishment hourly.

2d, A. M. Pulse 103, temp. 104. There is less swelling. The slough is separating from the lip. P. M. Pulse 104, temp. $104\frac{3}{4}$.

3d. The lip is still swollen, the chin less brawny. Pulse 98, temp. $103\frac{3}{4}$. There is less discharge from the wound, and the lip is assuming a healthier aspect. The diarrhœa has improved. The acneform pustules which were scattered upon the chin have almost disappeared, and the expectoration is less bloody. The right side of the face has not been affected.

4th, A. M. Pulse 98, temp. 103. From five or six "pepper-pot" openings on the anterior aspect of the chin there is an exudation on pressure of thick purulent material. A free longitudinal incision gave vent to pus, and showed the cellular tissue to be undermined—a probe passing upwards to near the vermilion border of the lower lip As the submental region was indurated and discharging pus, I also made an incision there of about an inch in length. The throat being tender to the touch on the left side as far down as the clavicle, I painted it with tincture of iodine.

6th. Pulse 84, temp. $101\frac{1}{2}$. A linear induration resembling a plugged vein or lymphatic has appeared upon the throat to the left of the median line which interferes with the extension of the head. The sputum is frothy and sanguinolent. An examination of the chest posteriorly revealed rude respiration without prolonged expiration. Bronchial râles, both subcrepitant and large, diffused over the lungs.

12th. Has improved steadily; the lip is resuming a natural appearance, and there is no discharge from the chin. Patient taking porter and cod-liver oil in addition to the tinct. ferri muriatis.

14th. Respiration 48. Percussion dull over the lower third of the anterior thoracic wall. No bronchophony. Respiration is exaggerated over the upper two-thirds of the chest, and diminished or feeble over the lower portion. Posteriorly percussion is dull over upper and lower third of the chest. Respiration exaggerated over superior part, feeble or absent over lower fourth. Expiration not prolonged. On the right side are subcrepitant râles. Expectoration is diminished, but still bloody. In addition to other remedial measures I have recommended him to practise deep respirations, while his body is bent forward, resting upon his hands.

March 12. The improvement is continuous. To relieve the cough I have applied to the larynx a powder consisting of pulv. tannin.. sacch. alb., āā ʒij. morphia muriat. gr. x. An examination showed pallor of the soft palate with a grayish and somewhat elevated ulcer near the right tonsil. The tonsils are small, pharynx reddish and venulated. Epiglottis of medium thickness, with congestion of posterior surface, enlargement of inter-arytenoid commissure. The great irritability of the pharynx interfered with satisfactory examination of the intra-laryngeal region. Supporting treatment was continued as long as the debility of the patient made it necessary. Accompanying this treatment, and a change of air, there was a gradual restoration to health.

I think this case illustrates the necessity of giving careful attention to any appearance of carbuncle upon the face, since its beginnings are comparatively so benign, when compared with the dangers which develop during its course. As has been said, the serious element of the disease appears to be a tendency to septicæmia the result of absorption. There can be little doubt as to the necessity of early support. My patient suffered considerably from headache, and I feared that the steady use of iron might have induced it, but looking upon the inflammation present as one of a low character, allied to erysipelas, and considering the muriate of iron as of much use in that disease, I concluded to continue the remedy, and I think with decided benefit. I have also at other times, as in this instance, found oakum, wrung out of hot water, and covered with an impervious dressing, such as oiled silk, a most excellent application, the carbuncle, or such incisions as are made necessary, being first filled with Peruvian balsam. This dressing is light, antiseptic, and absorbent.

With regard to incisions it seems to me that they should, as a rule, be limited by the indurated margin of the carbuncle. Made thus far, they relieve tension and facilitate the expulsion of sloughs. If more extensive, they produce pain and unnecessary hemorrhage, and perhaps open avenues for purulent absorption.

In singular contrast with the above case was that of a gentleman of over seventy whom I had under my care at the same time suffering from a small carbuncle upon the left upper eyelid. The glands of the neck were enlarged, but the pulse was only 72 and the temperature 100. A carbolic acid lotion (ʒj–Oj) was applied to the swelling, the tincture of the muriate of iron was given in ten-drop doses, and the patient convalesced in a few days. There was almost complete absence of constitutional disturbance.

Every physician appreciates the difference between those diseases which attack the patient promptly and openly and those which, as it were, crouch for awhile before making a deadly assault. To this latter class belongs carbuncle of the face, and it needs careful watching from the start.

REVIEWS.

ART. XV.—*Anæsthetics: their Position and Prospects.*

Deutsche Chirurgie; herausgegeben von Prof. Dr. BILLROTH in Wien, und Prof. Dr. LUECKE in Strassburg. Lieferung 20. Dr. O. KAPPELER: *Anæsthetica;* mit 18 Holzschnitten, 105 Curven in Zinkographie und 3 Lithograph. Tafeln. Stuttgart, 1880.

Anæsthetics. By Dr. O. KAPPELER; being Part XX. of "*German Surgery,*" conducted by Profs. BILLROTH and LUECKE.

Three Reports on the Action of Anæsthetics to the Scientific Grants Committee of the British Medical Association. British Medical Journal, Jan. 4 and 24, and June 21, 1879.

The Advantages and Accidents of Artificial Anæsthesia: A Manual of Anæsthetic Agents. By LAURENCE TURNBULL, M.D., Ph.G., Aural Surgeon to Jefferson Medical College Hospital, etc. 2d ed., revised and enlarged. Philadelphia: Lindsay & Blakiston, 1879.

THE most appropriate time for the consideration of a scientific subject is when some great advance has just been made, which places it in a changed and new position, or when doctrines have been, by long study and experience, so firmly established that they meet with general acceptance, and promise, at least for the near future, something approaching stability. It is needless to say that the present is not such a period in the history of anæsthetics. On the contrary, we find that in regard to one, chloroform, confidence is most thoroughly shaken, the practical disadvantages of ether are daily felt and lamented, while the frequent resort to various combinations of these, and the new agents which are being brought forward to supplant the others, are evidence of the unsettled state of professional opinion and the unsatisfactory condition of the subject.

But widely different as is the position of the subject from what we would desire, some good may result from a general consideration of it. Possibly, extreme views may be moderated, conflicting opinions disposed to harmonize, or, if not, it is something to look over past progress and see just where we are standing, what is the outlook ahead, and try to make preparation for possible further advance.

The appearance of the books whose titles are placed at the head of this article affords us an opportunity to make such an attempt. Dr. Kappeler's deserves the first place from its completeness, its accuracy, and its thorough scientific character. It will be noted that no title is attached to the author's name, and nothing indicates an official position. But his qualification is guaranteed by the work being one of a series, which, as a whole, is to present German surgery by the best German surgeons. In the list of authors we find such names as Billroth, Breisky, and Bruns, Esmarch, Hildebrandt, Nussbaum, Thiersch, Volkmann, Winckel, and many others equally well known. The student will not proceed very far in the book before he will discover that its author needs no indorsement from any one. His actual experience with chloroform is stated at "about 5000 administrations," but the careful study devoted to the subject is shown throughout, and especially in the sphygmographic tracing taken during anæsthesia, even during the early stages, a period presenting great difficulties, and in the careful noting of all the physiological facts attending every step of the process. Dividing the subject into general and local anæsthesia, he has treated it after the methodical and exhaustive manner of his countrymen. The bibliography occupies nearly seven pages, and includes much of the journal literature of this country and of Great Britain. In regard to the chemistry of anæsthetics, the physiology of anæsthesia, practical experience with other different compounds, and full presentation of all information upon the subject, the work must be considered complete up to the date of its publication.

The reports of the committee noted at the head of this article, brief as they are, form one of the most valuable contributions of recent times to the study of anæsthesia and anæsthetics. We could not expect less than work of high scientific character and practical value from a committee[1] appointed by the British Medical Association to investigate so important a subject. It is true that the ground gone over is not large in amount, but it has been thoroughly worked, and, as a consequence, has yielded well. The committee followed two lines of inquiry: first, to discover wherein lies the special danger of chloroform; second, to try if some anæsthetic agent could be found which would avoid these dangers. Distinct subjects of study were: the changes produced in the gases of the blood, the changes in the gases of respiration, and the effect of anæsthetics on the nervous condition and on mental phenomena in man. These investigations have been made by experiment upon animals, with the most approved instruments of precision, and with careful observation of every occurrence. The manner of experiment is important. The trachea of the animal was opened, and respiration carried on artificially, at the same time the sternum was removed, and the heart thus submitted to visual observation, while the blood pressure in the arteries was marked by the sphygmograph. Thus anæsthetic vapours could be added to the air inspired without any irritant effect upon the upper air passages, thus the different effect of different vapours upon the circulation was apparent, and in some instances was striking, and thus respiration was separated from the circulation and the effect of the vapour upon each of these great functions could be observed and studied while carried on independently of the other.

We regret that we cannot speak of Dr. Turnbull's work in terms of equal praise. It is a book having in many respects great merit, but having also most serious blemishes, faults, and errors, which the appearance of this, the second edition, afforded an opportunity of removing and correcting. The author has succeeded very well in attaining the objects in view, as stated in the preface of the first edition, of presenting the description, the chemistry and chemical tests, and modes of administering anæsthetics, together with his personal experience with them and the mortality resulting from their use. He has produced a treatise containing a large amount of valuable information which the student and practitioner will find difficulty in procuring elsewhere, but this information is not methodically presented or well arranged for either pleasant reading or profitable study. Were this all, there would be but little ground for complaint, but, unfortunately, the book contains serious errors and careless statements, and upon some points there is shown a spirit of unfairness, which must seriously interfere with its claims to be considered a scientific treatise. Some of the blemishes would not exist, and some of these serious charges could not have been made, had there been more careful proof reading. It is not satisfactory to read of Budin and Coyne's studies of the pupils in anæsthesia as studies of the pulse, and we imagine that Dr. Culbertson, of Ohio, although he may overlook the misspelling of his name, will not relish the presentation of his prize essay as the "*Sin* of Anæsthesia in Midwifery" instead of the "use"! Again, such statements as those on pp. 208, 224 should have attention called to them because positively dangerous! One is that chloral hydrate should be given with great care [!] to little children in doses of *three grains for each month!* The other, that a friend of the author has used "with success," in the obstinate vomiting of pregnancy, chloral in two-drachm doses, repeated in an hour or two if necessary! It may be inferred that the administration is to be by enema, but it is not so said, and even then, the dose stated is far too large without a word of caution being added. We regret to find, and to be obliged to call attention to these disagreeable features in a book which, with a little more care and attention, might have been a treatise of high character.

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[1] The committee consists of Joseph Coats, M.D., Pathologist, Glasgow; William Ramsay, Ph.D., Assistant to Prof. of Chemistry; and John G. McKendrick, Prof. of Physiology, University of Glasgow.

The two leading anæsthetics have experienced, since their introduction, wide variations of fortune. Chloroform, the discovery of which followed so closely upon the use of ether for anæsthesia, received a hearty and enthusiastic welcome. Its power, its certainty, the rapidity of its action, its convenience for the surgeon, and its lack of unpleasant characters for the patient insured its reception everywhere as a substitute for ether, and almost banished the latter from practice. But the dark feature of chloroform, its danger, very soon made its appearance, and able and influential advocates demanded the reinstatement of ether to its former place in professional favour. In two cities, Boston and Lyons, the change was immediate and thorough. In the former, where chloroform had never, probably, obtained the footing it had elsewhere, its use was entirely abandoned by 1853. In the latter, Diday and Petrequin opened the campaign in favour of ether as early as 1849, prompted by some fatal accidents from chloroform. The force and persistence with which the attack was carried on by the Lyonnaise, and the fact that Paris and other cities continued to adhere to chloroform, made the two anæsthetics subject of more polemical discussion, and of greater diversity of opinion in France than in any other country. Sedillot, of Strassburg, entered the field with the dogmatic proposition that "pure chloroform, well administered, never kills," and under the leadership of Malgaigne, the Paris Academy of Medicine declared, but not without dissenting voices, that with the observance of certain precautions, chloroform was entirely harmless. Velpeau, however, testified before the courts that chloroform might cause death, even when administered with the greatest caution. Yet the Surgical Society of Paris declared, in 1859, that ether could not take the place of chloroform because its narcosis was stormy, and entire muscular relaxation was not caused by it, unless pushed to a stage in which life was in danger. This brought from the medical Society of Lyons a counterblast; ether was declared to be innocuous, and its narcosis as perfect and as deep as that of chloroform. In 1866–7 Petrequin renewed the war against chloroform, and urged the fact that during fourteen years' exclusive use of ether in Lyons no death had occurred. In reply, Velpeau advanced his large personal experience with chloroform without an accident, and Sedillot again entered the field, his motto now modified, however: "the use of chloroform is not without danger, but it may be avoided by care, experience, and skill." In 1867 Laroyenne, of Lyons, published a fatal case of etherization, and six other cases were collected by Gayet, and although they would not all bear critical examination, they served to show that ether was an agent not altogether devoid of danger; the strength of attack of the Lyonnaise school was broken, and in France ether has never succeeded in supplanting chloroform.

In Great Britain, chloroform was, for the first decade and a half after its discovery, almost the sole anæsthetic used; ether had a few adherents, men of high character and standing. Edinburgh especially led in devotion to her native anæsthetic, and, like Sedillot's terse statement, that chloroform "*ne tue jamais*," the sententious doctrine of Syme and Lister, that "a case for operation is a case for chloroform," had a wonderful influence, as all such dogmatisms have. Soon after 1870, however, the tide began to turn in favour of ether. The change of current is attributed by Dr. Kappeler, to whom we are indebted for the facts of this historical sketch of the subject, to three facts: First, the increasing number of deaths from chloroform, and the enterprise of the British journals in placing these unfortunate cases before the profession, even to their minutest particulars. Second, the influence of Dr. Joy Jeffries, of Boston, at the Ophthalmological Congress at London, in 1872, in demonstrating the prompt effects of ether, in showing a simple method of administering it, and his impressive appeal in favour of it. Third, the demonstration of the Chloroform Committee, by experiment upon animals, of the minor degree of danger from ether. And now we are told it has the preference in many of the metropolitan hospitals, although chloroform is by no means abolished, while its use is extending through the country, and at the north especially, the mighty influence of Keith, with his splendid ovariotomy record, is powerfully felt in its favour.

In Germany chloroform has held a less disputed sway than in any other country, and is now, Dr. Kappeler says, so far as he knows, exclusively used. In Austria, however, the course pursued by Billroth is an index of the lack of full satisfaction with either chloroform or ether. He is an advocate of, and constantly uses, a mixture consisting of three parts of chloroform, one part of ether, and one part of absolute alcohol.

In regard to this country it is difficult to make any general and absolute statement of the past or the present, which being true of some sections would not be untrue as to the whole. Dr. Kappeler contents himself with stating that ether has never been entirely laid aside, but has always shared, even outside of Boston, professional favour. He gives as authority the statistics of the civil war: chloroform administrations, sixty per cent.; ether, thirty per cent.; mixtures of the two, ten per cent. Also those of the Marine Hospital [Service?] of the United States for 1874: chloroform, fifty-two per cent.; ether, thirty-five per cent.; mixtures, thirteen per cent. Of course in Boston, and throughout the territory where her influence is felt, which is certainly all of New England, ether has reigned supreme. We do not believe, however, that the statistics given above correctly represent the relative administrations of the two agents throughout the rest of the country by the profession at large. In our opinion chloroform was almost exclusively used, outside of New England, up to the few past years. Within ten years the current has been setting more and more strongly in favour of ether; the number of deaths from chloroform have become so numerous that they could not be overlooked; many have occurred under circumstances which afforded no plea as an escape; so that its dangers have been forced upon the attention of the profession, until now there is a feeling of distrust and fear which approaches to a general belief in the criminality of its employment except under special circumstances. Probably an exception must be again made in regard to this statement as to the South, that part which formed the Confederacy. There we believe chloroform to be much more generally employed and more freely resorted to than anywhere else in this country. We base our opinion upon the able and enthusiastic championship of this anæsthetic by Dr. Chisholm, of Baltimore, the only printed, as it is the warmest, advocacy of chloroform which has come to our notice for many years;[1] also upon the statement of Dr. Landon B. Edwards, given in Dr. Turnbull's work (pp. 110–111). This confidence in chloroform seems to be based upon the experience of surgeons with it in the Confederate army, and at the North we have found the warmest advocates of this anæsthetic among men who had large surgical experience during the late war.

We will give Dr. Kappeler's general statement of the present position of the subject in England, which will indicate also his opinion of the relative merits of the two anæsthetics and the direction in which he anticipates further knowledge.

> "The re-introduction of ether in England had as consequence a very considerable and important improvement in the art of administering it. It is undeniably more skilfully given, its effects more rapidly produced, and it is used with less discomfort and unpleasantness to the patient; yet in spite of all this ether has not the general usefulness and reliability of action, the simplicity of administration, the insignificance of after-effects of chloroform, and only the proof, based upon the broadest foundation of clinical experience, that ether narcosis was *considerably* less dangerous than chloroform narcosis, can give the victory to ether. This proof, however, has as yet been by no means furnished. Since the introduction of ether to England there has been recorded a considerable number of deaths from it, besides those formerly known, and the fatal cases have been where necessary precautions had not been neglected and such that the cause of death must with justice be attributed to the ether. It will be shown, farther on, how difficult it is to decide as to the relative danger of different anæsthetics, to attain to a correct percentage of the mortality from chloroform and from ether, yet it is probable that if in England, the country most favourably situated by the number and concentration of its medical institutions, the advanced standing of its medical societies, and the careful attention which from the beginning has been devoted to this subject, the deaths from ether shall be published with the same conscientiousness with which the deaths from chloroform have heretofore been made known, the materials will soon be obtained for the decision of a question so important for medical science as well as for suffering humanity."

Death under anæsthetics is of course the great and important fact connected with their use. The event is so shocking and painful to all concerned, the reverse is so dark where, without this, all is so brilliant, that its occurrence has from the first excited the deepest interest and stimulated the most scrutinizing investigation and closest study. It is safe to say, that it will continue to do so until we shall have attained the solid basis of assured knowledge. The deaths from chloroform seem to have much increased in frequency of late years, and now amount to a very considerable number. Dr. Kappeler says that "about 300" have been published, but is certain that many are unknown. He knows of four in his vicinity which were never published, and in this connection again takes occasion to compare the English with German journals, very unfavourably to the latter. Dr. Turnbull gives a table of 160 cases which have occurred from 1869 to 1879, and these, in addition to the table of the former edition of his book, make a total of 370 cases. But if the actual number of deaths cannot be ascertained, much less can we arrive at the relative number as compared with the number of administrations, a piece of information which would be of the greatest interest and most important value. Every effort at computing the total number of inhalations as compared with the number of deaths has been in the highest degree unsatisfactory and but the merest guesswork. Where statistics are reliable there is shown the widest variation in the proportion. Many of the deaths occurred of course to individuals who had administered the agent comparatively but a few times. In one hospital there was one death in 525 administrations, while on the other hand there is Syme with 5000 cases and no death; Nussbaum and Billroth in Germany, the first with 15,000 cases, the second with 12.500, and no deaths; Dr. M'Guire in this country, 15,000 cases and one death; the French army in the Crimea, 20.000 cases and no death; our army in the civil war, one death to 11,448 administrations. The computations of Dr. Andrews and Dr. Coles, of this country, are both given by Dr. Kappeler, the former making one death to 2723 cases, the latter one to 2873. Richardson's estimate is one death to every 2500 administrations, but his figures, made up of over 35,000 cases recorded in English hospitals, show one death to 3196. These may serve as indications and approximations; where two factors of the problem are not and cannot be known, it is useless to look for an accurate third. Whatever may be the mortality from chloroform, either absolute or relative, there are some points which cannot be left unconsidered without injustice. Thus, all cases should be deducted in which the administrations were by an unqualified person, or where the plainest rules of safety were violated. Thus in Dr. Turnbull's table of 160 deaths, in eight the administration was by a dentist or chemist, and two were cases of self-administration, = six per cent. In a collection of 133[1] cases there were seven cases of self-administration. Dr. Kappeler enters the plea that after all the figures, and admitting that chloroform is an element of danger in and of itself, yet it is at least doubtful if the cases of sudden death during operation caused by it exceed those which took place from fright and terror before it was known. He might have said even more than this. In Edinburgh, at an early time in the history of chloroform, when its administrations had amounted to many thousands without accident, there had occurred during the same period two sudden deaths on the operating table of this character.[2]

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[1] What anæsthetic shall we use? By Julian J. Chisholm, M.D., Baltimore, 1877.

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[1] Am. Jour. Med. Sci., Oct. 1867.

[2] Sir J. Y. Simpson's Works, Anæsthetics, p. 146.

We cannot imagine how Dr. Turnbull should attribute to the writer of this the view that death in the earliest stages is caused *only* by emotion (p. 96), as we have only maintained that to be one of the causes of death. He takes occasion to say that he does not agree with this view, "else the same result would have followed when ether or nitrous oxide is employed." Well—turning to p. 201 of his work, where is recorded the death from nitrous oxide reported by Dr. Newburgh, of New York, we read that "the inference seems entirely justified, that death was not caused by nitrous

But the cause, or rather the physiological process of death under chloroform is a subject of far deeper interest than a computation of numbers. The importance of the inquiry is at once apparent, for the *modus operandi* of the deleterious influence once discovered, the way to avoid the peril would be plain. So, to account for these deaths, we have had explanations without number, hypotheses the most untenable, and theories the most fantastical; ingenuity has been taxed to the utmost in the formation of some of them, and logic torn to tatters. This may seem to be exaggeration, but the facts warrant every word, as a brief examination will show. Thus we have so high an authority as Mr. Lister[1] maintaining that the greater number of deaths from chloroform arose from an "overdose from too long-continued administration;" and this in face of figures showing that nearly fifty per cent. of them took place before narcosis was complete, and a large number during the very earliest stages.

The theory of a peculiar idiosyncrasy on the part of the patient, originating with Robert, has found lately an adherent in Billroth.[2] Yet we find no such idiosyncrasies in regard to other medicines; somewhat greater effects may be produced in some patients than others, but opium, strychnia, or arsenic never cause death when administered in ordinary doses. But admitting the most extreme claims for the existence of idiosyncrasy, in order to accept it as a satisfactory explanation of death from chloroform we must admit that it is as changeable as the wind. A large number of those who have died under chloroform had taken it before, some of them several times; then we must assume that a patient may have to-day a constitution under which a medicine is safe, and to-morrow such an one as renders it fatal.

An explanation of death was found for a time in impure chloroform, but this theory had but a short life, and we then had theories of chemical and of mechanical effects. According to some of the former, oxygenation of the blood was interfered with in various modes, or the vital fluid was directly acted upon and changed, and by the latter it was now a mechanical closure of the larynx, and again an expansion of the anæsthetic in the nervous centres producing death by compression of the delicate structures!

The mechanical theory of death from a collection of mucus in the larynx and air passages was soon shown to be false by performing tracheotomy on animals and by failure to find the alleged cause *post mortem* in a single case. That in regard to obstruction by falling backwards of the tongue is yet in vogue. But the knowledge of the possibility of this accident furnishes a reliable safeguard, and, as Dr. Kappeler well remarks, in all the later deaths there has been no sin of omission upon this point in a single case, yet, nevertheless, the deaths occurred.

Some of the theories have been more plausible, more reasonable, and, because accounting well for a fair proportion of the cases, have enjoyed for a time the favour of many, both leaders and led in the profession. Of these the doctrine that the cause of death lies in faulty administration has been the longest lived, for it began with Sedillot's "le chloroform pur et *bien employé* ne tue jamais;" and is yet in vogue with some. It accounted, and to our mind satisfactorily, for those cases which elude all other explation, where death takes place in the very earliest stages. The sudden and violent impression upon the terminal branches of the par vagum produced,

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oxide gas," but it is "entirely probable that the cause of death was *nervous shock* from *dread of pain and apprehension* of fatal effect from the inhalation of an anæsthetic agent"!

[1] Holmes's Surgery, vol. v. p. 488.

[2] Kappeler, p. 110.

by reflex action, sudden cessation of the heart's action. Such a view is supported by analogy, is reasonable, clinical experience accords with it, and it is, Dr. Kappeler says, the teaching of all late physiological experiments. Nothing sustains this view more strongly than the report of the Anæsthetic Committee as to the variation in blood-pressure in rabbits produced by the addition of more chloroform, the animal being partially anæsthetized :—

"When the animal is not fully under chloroform, *any fresh administration causes most remarkable variations in blood-pressure*, with retardation of the heart's contractions."

No one can critically examine the record of chloroform deaths without being struck with the number in which the fatal event followed immediately upon the addition to the sponge or apparatus of a fresh supply of the anæsthetic agent.

The theory of faulty administration as the sole cause of death from chloroform is a peculiarly seductive one, especially to those who have had large experience without meeting with a misfortune. Some special mode of administration, or some measure of precaution, like the preliminary dose of whiskey, is seized upon as an explanation of the immunity from accident, and then the work of convincing others, that "if my plan be followed there is no danger," is entered upon with enthusiasm and positiveness! We have felt in the past all the force of this doctrine, because fully convinced that many deaths have been caused by mal-administration, because this doctrine gave the best ground for the continued use of an agent that we did not wish to abandon.

But the theory is no more tenable than the others. To assume it to be correct we must first conclude that the chloroform was badly administered in all those cases of death in hospitals, where it was in the hands of men who had made it the subject of most careful study, who had had large experience, and who devoted to its use the most scrupulous care. We must conclude that Snow did not know how it should be given, that Simpson himself, after introducing it, and after using it for nearly thirty years, did not know how to administer it. As Dr. Kappeler remarks, a speedy end has been brought to many a dream of fancied security and belief in the harmlessness of chloroform.

Next comes the theory that death is caused by the inhalation of too concentrated chloroform vapour. This theory is sustained by all the points which explain the early deaths as already given, and also in the most marked manner by experiment upon animals, which show, too, that it is not alone in the early stages that death is thus caused. This was the theory of Snow, and his influence was powerful in causing its reception, especially in his own country, where it has always been the favourite theory. It "runs like a scarlet thread," to use the expressive language of Dr. Kappeler, "through all the chloroform literature of England." To this theory the existence of inhalers is largely due. Experimenters had agreed very closely in the results obtained, and had fixed very nearly the due proportions of air and chloroform vapour for safe administration. Thus Snow gave five volumes of vapour to ninety-five of air, and showed plainly that ten per cent. was dangerous. Lallemand, Perrin, and Duroy found that animals lived a long while in a four per cent. mixture of chloroform vapour, but died rapidly in one of eight per cent. The English Chloroform Committee stated the maximum for safety to be four and a half per cent. As it was a simple problem of mechanics to construct a machine regulating the amount of vapour inhaled, and the due proportion of air, the vital problem seemed equally easy of solution. Yet what has been the result? The history of inhalers for chloroform administration is full of disaster. Of thirty fatal cases, carefully selected as bearing close scrutiny in regard to every precaution having been used, the administration was by an inhaler ten times. Anstie had dangerous symptoms once in one hundred and forty-five times, and used an inhaler in two-thirds of his cases. Of ninety-five fatal cases reported by the Chloroform Committee, an inhaler was used in twenty-eight. The best device, and indeed a perfect instrument, for insuring a due and known mixture of chloroform vapour and air is Clover's rubber bag, into which is introduced a measured quantity of the anæsthetic, and breathing from which by no possibility can the patient get an undue proportion. Yet of fifty-six fatal cases tabulated by Dr. Kappeler five took chloroform from Clover's bag, and in four other of these cases an inhaler was used. Moreover, this source of danger has been recognized by the profession long enough. Sansom, following in the footsteps of Snow, emphasized it. It has neither been overlooked or forgotten, and still deaths from chloroform have rather increased than diminished.

Diversity of opinion as to the mode in which death under chloroform takes place has been equally marked. There have not been quite as many different doctrines and explanations, on account of the limited number of vital organs of the body to which they could be attached. The blood, the nervous centres, the heart, and the lungs, have each severally been looked upon as the special seat of action of the deleterious influence. Asphyxia, syncope, paralysis of the heart, interference with the functions of the nervous centres of circulation and of respiration, destruction of the corpuscles of the blood, and of the nervous cells by chemical action of the inhaled vapour, have all had their advocates, and no one of them has been satisfactory to or accepted by all. It would seem to a layman, perhaps, that there could be no excuse for this diversity of opinion on so momentous a subject, and that order would be speedily brought out of confusion by the results of *post-mortem* examinations. Yet this generally reliable resource fails here. Examination of the bodies of those who have died under chloroform does not furnish any uniform change or condition of any of the vital organs. Fluid blood, the one single universal condition, belongs to sudden death without reference to the cause. The lungs have been sometimes congested and sometimes anæmic; and the brain in various states as to the amount of blood in its vessels. Marked changes are generally found in the heart, but they are not uniform; it is sometimes distended and sometimes contracted, although in the majority of instances the right cavities are loaded with blood. Many of the deaths being distinctly cardiac in character, a determined effort has been made to connect them with a pathological condition of the structure of the heart, fatty degeneration of its muscular fibre, and this condition is looked upon throughout the profession, we believe, as one of peculiar peril for the administration of chloroform. "Fatty degeneration of the heart" is readily accepted as a sufficient explanation of the fatal result. Dr. Kappeler does not share in this view, denies, indeed, that it has any sound clinical foundation, and since the point is an important one we will give his reasons. In his table of one hundred and one cases of death the results of *post-mortem* examination are fully given in fifty-three. In the report of these examinations fatty condition of the heart is mentioned more or less explicitly sixteen times, yet only five times was it based upon a microscopic examination. He then says :—

> "But it must not be forgotten that in these examinations the charge of fatty heart is made in order to relieve chloroform and its administration, and that, therefore, to a minimum amount of degeneration an importance is ascribed which in reality it has not and which would not bear a critical investigation.
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> "I cannot avoid stating here what my friend, Prof. Roth, of Basle, a careful and conscientious observer, wrote upon this point: 'Minor degrees of fatty degeneration of the heart I meet with in the sections I make, with very great frequency, under the most various circumstances, in advanced age, in acute and chronic diseases, etc., and I do not rely upon ocular but upon microscopic examination.'
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> "That to fatty heart is to be ascribed only a relative and by no means an absolute danger, is apparent from the fact that of my sixteen patients with this complication eight had already before, and mostly but a short time before, inhaled chloroform, and in view of the great danger that is ascribed to this pathological condition it has always appeared surprising to me that I have never met with an unpleasant symptom in chloroforming for twenty-six amputations on account of senile gangrene, in which, besides the affection of the arteries, in four cases wide-spread fatty degeneration of the cardiac muscle existed as shown by *post-mortem* examination and microscopic investigation. Also, I failed to find in the literature of the subject a single case of death from chloroform when it was given during the existence of senile gangrene, a condition which is notorious for frequency of association with disease of the muscular structure of the heart. I remember Virchow's words: 'Of very great importance is the condition of the cardiac muscle, which especially in senile mortification is *very frequently atrophied and the subject of fatty degeneration.*'"

A careful examination of all the facts will show, we believe, that the heart has received too great a share of attention as the starting point of disaster from chloroform, and that the importance of the respiration in this respect has been overlooked. Of all the vital functions this is the most immediately affected by inhalation of chloroform, and upon this there is a twofold action, the direct influence of the vapour upon the air-passages and an indirect influence through the respiratory nervous centre. Of all the vital actions respiration is the most variable under the administration, passing through all degrees of irregularity and even to complete cessation of considerable duration from tetanic muscular contraction. In animals it is the function which constantly succumbs before the circulation. A critical examination of reported cases of death sustains this view. Thus in Dr. Kappeler's list, and we give this alone because it is the latest contribution to the subject, and time will not permit full presentation of all cases, there are forty cases in which the symptoms preceding death were well described and carefully recorded. In seventeen of these the danger was first announced by the respiration, and this function ceased before the action of the heart stopped. Of these cases two groups may be formed, the first in which narcosis was perfect, ten cases; a second, in which full anæsthesia had not been reached, seven cases; in all the latter death took place during great muscular excitement or rigidity. Where the facts are fully known it appears, therefore, that in over forty per cent. the death was not cardiac, but directly or indirectly respiratory.

Death by a direct action on the nervous centres, of which the cardiac and respiratory symptoms were the expression, was probably too simple a theory to be popular. Explanation of this action by surmising a dissolution of the fat of the nervous molecules, a deleterious influence upon the protagon, and similar hypotheses were plenty. But the commission of the *Société Médicale d'Emulation* reached the plain truth. It denied that the sudden deaths were caused either by asphyxia or by cardiac paralysis, but rather by a "cessation of the function of the nervous centres, which absorb the anæsthetic vapour, their excito-motor power is destroyed, respiration ceases, then the circulation, and death results."

Accumulated facts and their study brought finally the only conclusion possible. Among all the conflicting opinions as to modes of death and different theories as to its causes, the majority contained more or less of truth, some were absolutely correct, yet no one of them would suffice to cover the whole ground. In other words, the causes of death are various and the modes of death are different. Chassaignac and Maisonneuve recognized a death by syncope and by asphyxia, and they were followed by Weber who amplified upon them. Then came Sansom's excellent work teaching that death may be by syncope, by asphyxia, and by necræmia.[1] Later, in 1870, Richardson gave four classes, death by syncopal apnœa, by epileptiform syncope, by cardiac paralysis, and death by depression of the nervous system. Erichsen also recognized three modes of death: by asphyxia, by coma, and by syncope. To this class of authors Dr. Kappeler belongs, and we may give his views as presenting the result of the latest and a most careful study of the subject. At the outset he makes the statement that "in spite of the large amount of physiological study as to the action of chloroform, which has been successful in substituting much knowledge for hypothesis, and in spite of careful clinical observation, it is not yet possible to give a satisfactory explanation of all deaths from chloroform." It is indubitably proved, he says, that there are a large number of the deaths from syncope, cardiac, and also a large proportion from asphyxia, the respiratory actions ceasing before the circulatory. Referring to his table of the deaths by syncope, seven took place before complete narcotism was produced, some of them at the very outset of the inhalation. A portion of these he says undoubtedly belong to that class of well-known sudden deaths on the operating table before chloroform was discovered. We would suggest, also, that the administration of the anæsthetic itself, introduces a new, a mysterious, and a powerful emotional influence quite as likely to cause death in this manner, as fear of the operation. A great dread of the anæsthetic has been a striking feature in some of these cases, and, as seen in a case already referred to, not confined alone to chloroform. As accounting for other of these deaths, he fully accepts two explanations for which we have always contended: first, a death from shock, the primal impression being the surgical operation, the patient being only partially anæsthetized, producing by reflex action cessation of the heart's movements; and second, one in which the impression is upon the air passages by the sudden inhalation of concentrated chloroform vapour. The syncopal deaths occurring under the full operation of the agent he explains by syncope, a syncope which is the direct effect of the chloroform. It is not that chloroform, by its depressing influence, converts a syncope originating in other causes into a fatal one, but "the syncope itself is produced by the chloroform." The deaths by asphyxia he also divides for study into those occurring while narcosis is incomplete and those when it is perfect. In the former the dangerous symptoms have always been preceded by great muscular excitement and contraction, and whatever explanation may be made of them the favouring influence of the tetanic contraction of the chest muscles and its retarding influence upon the respiratory process, must not be overlooked. For asphyxia in deep narcotism the direct influence of the agent upon the respiratory nervous centre is to be considered. For these and the cardiac cases, whatever may be proposed or suggested, possible or probable, "we are fully justified in assuming a sooner or later appearing paralysis of the centres of respiration and circulation situated in the medulla oblongata."

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[1] Dr. Kappeler refers to and quotes an article published in the number of this Journal for Oct. 1867, but why he has added a class of "cases affected with chronic heart disease," which is not to be found there, it would be difficult to explain. He does not seem to recognize that Class VI. of that article illustrates and sustains his own conclusion, announced a few pages further on, that some cases are entirely inexplicable.

A careful, a thorough, an exhaustive study of the action of chloroform, and of the accidents from it, leads inevitably and unmistakably to but one conclusion. With the single exception of the suddenness with which danger appears, there is nothing regular but irregularity, nothing certain but uncertainty. Neither the direction from which disaster may come nor time of its occurrence is to be relied upon. Even when the administration has ceased, the point of safety has not been reached. In Dr. Kappeler's fatal case, two minutes had elapsed since any chloroform had been inhaled, and this is not a single instance. It may be objected that possibly there is a mistake about this and some other points, that the circumstances are not favourable for accurate observation. Then we will refer to the experiments made by the British Medical Association Committee, the accuracy and carefulness of which place the seal of demonstration upon this feature of the action of chloroform. We quote from the report, italicizing some of the words and sentences.

> "Chloroform may cause death in dogs by primarily paralyzing either the heart or the respiration. The variations in this respect *seem* to depend to some extent on individual peculiarities of the animals.
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> "Chloroform has sometimes an *unexpected* and apparently [?] *capricious effect on the heart's action*, the pressure being reduced with great rapidity almost to *nil*, while the pulsations are greatly retarded or even stopped. The occurrence of the *sudden and unlooked-for* effects on the heart's action seems to be a source of serious danger, all the more that in two instances *they occurred more than a minute after chloroform had ceased to be administered and after the recovery of the blood-pressure.*"

It is this irregularity and uncertainty of action which has shaken confidence in chloroform, and the demonstration of this stamps it as a *treacherous* remedy, and shows that no measures of precaution can prevent, no care avert disaster. Velpeau, at an early period of the history of chloroform, discerned this, and made his declaration to the French courts, that it might cause death in spite of all precautions. Richardson, after a careful study of the subject, said, "that no human skill in applying it can divest it of its dangers;" and now comes Dr. Kappeler to repeat, almost word for word, their opinion as the result of his study and experience. It is the conviction of this uncertainty and unreliability which has turned the current of professional opinion away from chloroform; which has caused hundreds to abandon its use, not willingly, but sadly, in obedience to the stern logic of facts. We can appreciate and realize the feelings under which they have acted. Honouring chloroform for the wide extension it has made to the bounds of operative surgery, esteeming it as the chief handmaid of their art, cherishing it for the untold human suffering it has abolished, prizing it for the certainty, the celerity, and the pleasantness of its action, they have yet felt compelled to give it up. They have parted with it not without some of that emotion which, it is said, should not enter into science; they have parted from it as they would bid farewell to an old friend, prolonging the last grasp of the hand, delaying to speak the final word, sick at heart with the feeling that but for one fault there could be no other such friend as this.

Yet chloroform is not going to pass into oblivion, or even into entire disuse. There are two classes of cases in which, in all human probability, it will still be used, because the benefits resulting from it are immense, and the dangers to be feared from it as nearly as possible at zero. As an anæsthetic for children chloroform stands yet unrivalled; and when a better one is found the profession will truly have cause for congratulation. Deaths have occurred from it, in this class of subjects, it is true, but so rarely that we believe it entirely justifiable to use it, and even repeat it daily for a painful dressing or examination. Dr. Kappeler's table contains two cases of death of children—one two, the other four and a half years of age; Dr. Turnbull collects eighteen cases as having occurred since 1849. No numerical estimate of the proportion can be made, yet clinical experience has fully shown that the amount of danger to this class of subjects is infinitesimal. Even the last-mentioned admits the use of this anæsthetic for "very young children."

Women in labour constitute the other class of cases for which chloroform bids fair to be yet long used. As an assuager of the pains of parturition it has proved itself efficient, reliable, without danger, and with only disadvantages and drawbacks that can be avoided by such careful and judicious use as should always attend the administration of potent remedies. So well recognized are its advantages, not merely as an anæsthetic for surgical obstetrics, but as an agent for the diminution of suffering, that the use of it in natural labour is no longer defended or apologized for in our text-books, but directed and, under proper restrictions, encouraged. Of all the gifts of medicine for the alleviation of the suffering of woman, this is the brightest and the best.

Entertaining these views, we can feel but little satisfaction with Dr. Turnbull's treatment of this part of the subject. He grudgingly admits that the experience of British practitioners "is generally understood to have disposed them to regard the use of chloroform in labour as a proceeding of the highest utility and moment and practically free from danger." This is all he can say in its favour. He alludes to France, where chloroform in labour has "not yet become acclimated." It is true that some honoured names in the roll of French obstetrics have opposed its use for the relief of pain.[1] Yet the extent of their experience may be judged of from the fact that they have taken the utterly untenable ground that there is no such thing as demi-anæsthesia, even ridiculed its existence. On the other hand, there have been able advocates for its use even in France, and the dissenters have been but a fraction of the profession.

Dr. Turnbull copies the conclusions of a paper read by M. Richard before the International Medical Congress of Geneva, the first of which reads: "The employment of anæsthetics is, as a general rule, advisable in natural labour," with the remark that "they are *not generally approved of* by the majority of gynæcologists." [?] He should have named the dissenters and given their opinions. He quotes from Dr. Lusk the conclusions of a paper read by that gentleman before the American Gynæcological Society on "The necessity of caution in the use of chloroform during labour," and fails to copy the statements made in the body of the paper that the administration of chloroform during natural labour is legitimate, or the admission that there is not on record a well-authenticated case of death from it during labour when administered by a qualified medical man. Having read this, as he must have done, he gives as an instance of death from chloroform during labour, without any comment, a case in which the patient had had a convulsion, for which the anæsthetic was administered, and just before she died she had another "slight tremor." [Convulsion?] He gives again, without comment, a case in which "*three pints of chloroform*" were used as an instance of its injurious effects! All this is not fair, and it is upon this that we base a charge of lack of the scientific spirit as a feature of Dr. Turnbull's book.

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[1] It would be interesting to know how much *personal* feeling has had to do in this matter. It would not be the first time that such feelings had influenced the progress of science. The late Charles James Campbell, of English birth, won for himself in the French capital a brilliant reputation, a most enviable position, "with immense practice, and crowds of wealthy and influential patients from all countries." He was an ardent advocate of chloroform in natural labour, and his success was largely due to his use of it. This, naturally enough, would not be very pleasant to native Parisian obstetricians, and conservatism and personal feeling might be easily confounded. See Dr. Playfair's Annual Address to the Obstetrical Society of London.

It is not an easy task to arrive at satisfactory conclusions in regard to ether, or to state fairly its relative results. We are not here embarrassed by the number and variety of theories as to its action, for the difficulty is rather a paucity than an excess of literature. It is a singular fact, in view of the rapid advance in favour of this agent, its importance, and the extent to which it has displaced chloroform, that it has not been the subject, now for many years, of a complete and thorough treatise. Partisanship has come in, perhaps to warp testimony, certainly to influence judgment, and we find disagreement as to facts and varying deductions from those who have presented us with the result of their studies, and to whom we look for our information.

Restricting observation to the more prominent symptoms and the major functions affected during administration, it may be said that in only one point do ether and chloroform present a close similarity of action. This is in regard to the depression of temperature produced by them. It is the result of Dr. Kappeler's careful study, that a fall takes place without exception under both; this with ether varies from .3° to 1.5° C., average .68, and with chloroform from .2° to 1.1°, average .59. Leaving out the cases having fever, and the remarkable correspondence is shown of .53° for chloroform, and .52° for ether.

Irregularity of respiration is common to both, but is much more marked with ether than with chloroform. It begins with ether at an early stage with that sense of suffocation which its vapour produces, and which is one of the most unpleasant and most unbearable of sensations, it is marked during the whole course of administration until the regular snoring of deep insensibility comes on. This marked interference with this important function is closely allied to or consequent on the much greater amount of muscular excitement produced by ether. While violent muscular action is exceptional with chloroform, it is almost constant under ether. In two hundred administrations Dr. Kappeler saw it violent and long-continued in two-thirds of the cases, and in only ten, all but two of whom were children, was it absent or but slight. That this general muscular rigidity with tetanic contraction of the chest-muscles is a period of special danger with chloroform has already been shown, that the danger at this point is not so great under ether we believe certain. Dr. Kappeler saw only three cases in which it became necessary to resort to measures of relief. He admits, in regard to this feature, that much depends upon the manner of administration. Since he has used Clover's lesser apparatus he has found the stage of excitement much less marked.

It is in regard to their effects upon the circulatory system, upon the action of the heart and the blood-pressure in the arteries, that these two agents differ most widely, and the consideration of this difference assumes the highest importance from its close connection with death under their influence. The generally accepted view we believe to be that ether exerts a decided stimulating influence upon the heart and circulation. That it does not exert a depressing influence seems to be the unmistakable result of experiment upon animals. This was plainly shown by the English Chloroform Committee, and it is again shown by the Anæsthetic Committee now pursuing its investigations. We would rely upon any decision reached by that committee with absolute confidence for reasons already given, and the result of this latest and scientific study is that while both chloroform and ethidene administered to animals have a decided effect in reducing the blood pressure, "*ether has no appreciable effect of this kind.*" "*It may be given for an indefinite period without interfering with the action of the heart.*"

But when we turn to investigations as to this point made upon human beings we regret to find that the testimony does not agree. Dr. Turnbull quotes the observations of the late Dr. Morgan of Dublin with the sphygmograph, gives the tracings, and quotes from him that "the most perfect anæsthesia could be invoked under the influence of ether, with an absolute stimulating effect on the circulation." Dr. Kappeler says that "in ether narcosis deep enough for painless operations, an alteration in the pulse-curve does not follow in every case, while in deep chloroform narcosis the pulse curve shows, without exception, characteristic and marked changes." He has made ten careful observations, and gives in his book seven of the tracings:—

> "Of these ten there were three in which no change, or a scarcely perceptible change in the curve, took place, although the patients were deeply anæsthetized, an occurrence not found in one of the twenty-five cases of chloroform narcosis; *in seven of the ten cases the curve of deep ether narcosis differed not at all from that of chloroform narcosis.*"

This brings us to the consideration of the mode by which death under ether takes place. The general impression we believe to be that death never occurs under this anæsthetic with the frightful suddenness that it does under chloroform, that it is always respiratory and not cardiac. The question is of course no trifling one, since if the route of disaster is by the respiratory function the danger is announced, and there is an immense amount of resource for rescue, while if it is by the heart there is no warning, and the patient is generally dead before the first efforts at resuscitation can be put in force. Dr. Turnbull is positive upon this point. He says that ether "always gives warning before it causes the death of the patient." Nevertheless, cases 6 and 8 of his own table, given only a few pages from the above statement, seem to have been as sudden as any under chloroform as far as can be judged from the brief reports. Dr. Kappeler finds four cases out of nine deaths under ether, in which the fatal symptoms arose from the circulatory apparatus as well as from the respiratory, and in which the death was sudden.

It is at once a singular fact, and a matter for regret, that neither of the works under consideration makes any attempt to present the total number of deaths which have occurred under ether. This seems to be a very important matter, when chloroform is under consideration, but of no consequence in regard to the other anæsthetic! Dr. Turnbull's table contains eighteen deaths, of which nine present no extenuating circumstances, and are pure ether deaths, yet the time covered is only from 1873 to 1878. Dr. Kappeler gives thirteen fatal cases, nine immediate and four soon after administration. Of the nine immediate, two cases were certainly and one probably suffocated by ingesta getting into the air-passages, and three underwent severe operations, leaving four deaths due to the anæsthetic. His collection contains no case previous to 1872. There is a long gap between Perrin and Lallemand[1] and these authors which we do not know how to fill, so that our knowledge upon this point is singularly lacking.

It will have been noted that Kappeler gives a class of deaths occurring after the administration is over, and in this respect ether is no more free from reproach than chloroform, indeed is more open to it. He refers to the investigations of Lallemand, Perrin, and Duroy, as showing that "ether is retained a longer time in the organism, and has therefore a decidedly more prolonged operation." The fact is beyond question and an instance was lately testified to us by an eye-witness. The patient was a healthy young man, the operation extirpation of the eyeball. It was performed under ether, had been completed and so far over that all were engaged in examining the specimen, when all at once dangerous symptoms were manifested by the patient, and only most energetic measures succeeded in saving him. This case has never been published, and it may be mentioned as one offset to the point made, and justly made, in regard to the mortality from chloroform, that very many cases have never been made known.

In attempting to estimate the ratio of deaths from chloroform to administrations one factor is, approximatively, known—the number of deaths. But even this is lacking in regard to ether, and figures are no better than guesswork. We miss very much, as to ether, such statistics as those of the armies of different nations, and those prepared by Dr. Richardson from the hospitals of England in regard to chloroform. Nevertheless, the current doctrines of surgery and the practice of the art do not always depend upon numerical statements, and for the relative safety of the two great anæsthetics we must get what we can from figures and then go beyond them. The authors of the *Traité d'Anæsthesie Chirurgicale* attempted a comparison of the two by numbers, and arrived at three deaths from ether during the first fifteen years of its use, and seventy-seven from chloroform during the first fourteen years. But as chloroform for a time almost entirely banished ether for use, no calculation can be thus made. We would prefer to take the first year during which ether was used, which gives one death, and the first year of chloroform, when, we may assume, it was almost exclusively used, and that gave nine deaths. The very attempt, without the number of administrations of each, shows how vain it is. In the absence of figures, such general statements as the one made by Dr. Turnbull are important:—

> "In the city of Philadelphia alone it [ether] has been used, with but one exception, since its introduction in 1846 up to the year 1878 . . . without a single primary death and only one recorded secondary death."

The exact meaning of "with but one exception" is not clear. It is not possible that chloroform has been but once administered in that city within that time, or that it has been used by but one surgeon!

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[1] Traité d'Anæsthesie Chirurgicale, 1863. They give three deaths from 1847 to 1859, yet Dr. Turnbull, p. 32, gives only four deaths as the number up to 1872.

All the general testimony of this kind is decidedly in favour of the far, the very far, greater safety of ether as an anæsthetic as compared with chloroform. The tone of medical journals as they record the frequent deaths from the latter, the current of professional opinion, the abandonment of the one agent for the other by surgeons almost everywhere, show that the lesson has been learned from facts quite as well as from figures.

Dr. Kappeler, in summing up, says:—

> "It is not possible to obtain an insight into the mechanism of death under ether from such a scanty number of observations. Only further experience and numerous new observations can throw light on the subject. And it is by no means apparent from the material before us that ether-death in human beings is essentially different from chloroform-death, or that, as physiologists hold in regard to animals, the fatal result in man always begins by disturbance of respiration, and in every case proceeds from the respiratory system. The assumption of the physiologists (Schiff), therefore, that the surgeon is responsible for death from ether, in contradistinction to chloroform, and that death from ether may always be avoided by precaution, stands, in my opinion, without any foundation whatever. From the experience of the operating table it cannot yet be maintained with absolute positiveness that the administration of ether as an anæsthetic has a considerable less amount of danger than chloroform. We are as little prepared to state in figures the dangers of ether as those of chloroform, since neither the number of deaths from it nor the number of administrations is known, and the few attempts made to state the proportion of deaths to administrations are mostly the product of the bitter contest: ether *versus* chloroform, and the necessary impartiality is lacking. It is well, however, to bear in mind that the late proclamation from Lyons of the absolute safety of ether, and the late disavowal of the same from the same place, brings us *ad absurdum;* that, as already stated, since the resumption of the use of ether in England, deaths have occurred from it in more considerable number, even by careful administration, and that, with the more frequent use of the agent, the number of accidents has increased."

We can by no means assent to the major proposition; cannot understand, indeed, how the author could formulate it from the facts contained in his own book and from the literature of the subject which he has examined. That he does so, indicates, we think, an absence of that impartiality which he so much deplores. If deaths from ether are multiplying so rapidly, he surely should be able to present a greater number than he has, especially from that country where, we are told, it is being more frequently used, and where the enterprise of the medical journals has won his commendation. The truth is, there is no approach in number of deaths from ether to those from chloroform. The proof *is* "based on the broadest foundation of clinical experience" that ether narcosis is not only "considerably," but *very much* less, dangerous than chloroform narcosis. Then we have the testimony of experiment on animals, repeated again and again, and always strong on the side of the relative safety of ether as compared with its rival. When clinical experience and experiment coincide and sustain each other, the question must be considered settled, for there is no higher court of appeal.

But, as with chloroform, other considerations than those of safety alone will influence the use of ether. The difficulties of its administration are not such as to stand much in the surgeon's way. Yet its tardiness of action, especially mentioned by the Anæsthetic Committee, and its unreliability deserve consideration. Turnbull and Kappeler both give cases which could not be brought under its influence. And, again, there is its inflammability, which rules it out of operations by artificial light. Then there is the vomiting, in regard to which, however, we have the widest differences as to facts. Dr. Turnbull states that in his practice it occurred only once in fifty cases. Dr. Kappeler observed it in twenty-five per cent. of his administrations, against fourteen per cent. for chloroform. Impurity of the article used cannot be adduced to explain this, since he has used only ether from the best pharmacies of Lyons. The disagreeable smell and taste of the ether, which persists for hours, sometimes for days, is a great annoyance to patients; and, although the profuse salivation of inhalation may be a trifling matter, the sense of suffocation which attends it is far from being so. To those who would overlook or despise this feature, we suggest a reference to a jury of those taking it, rather than those administering it. It is at least serious enough to have lately been the subject of an editorial in a prominent medical journal,[1] and we believe with the author of that article that its administration without due consideration of this effect is a piece of positive cruelty.

Mixtures, in varying proportions, of chloroform and ether made their appearance at an early period in the history of anæsthesia. They were the natural outgrowth of dissatisfaction with the disadvantages of ether and experience of the dangers of chloroform. Their use received a powerful impulse from the influence of the Chloroform Committee. The report of that Committee impressed the importance of gradual administration and free dilution of chloroform vapour, both of which are insured by mixture of the liquids, and proved by experiments on animals the less depressing influence upon the heart of the combined vapours. That Committee investigated three mixtures: alcohol one part, chloroform two parts, ether three parts; chloroform one part, ether four parts; chloroform one part, ether two parts; and recommended them for further trial, as combining the effects of the two, and the first especially "on account of the uniform blending of the ether and chloroform when combined with alcohol, and probably to the more equable escape of the constituents in vapour." This mixture, generally known as the A. C. E. mixture, should be called "Harley's mixture," as he first proposed and used it.[2] But, notwithstanding the powerful endorsement and recommendation of that Committee, at a time, too, when the profession was saddened and disappointed by the discovery that chloroform was not trustworthy, none of these mixtures ever succeeded in gaining general confidence or passing into general use. In some localities, and by individual surgeons, these, or similar combinations, have been preferred, and have been used sufficiently to furnish quite a large experience. In this country the late Dr. Atlee used the third mixture of the Chloroform Committee, and under its influence performed three hundred ovariotomies, without accident (Turnbull). The mixture of six parts of ether to two of chloroform has been used so generally in Vienna as to be called the "Vienna mixture," and there have been over eight thousand administrations of it without a fatal case (Kappeler). Billroth, in recent times, has used exclusively a mixture, chloroform three parts, ether and alcohol, of each, one part, believing it to be safer than chloroform.

The accidents from these mixtures have not been numerous. Dr. Kappeler gives two, and Dr. Turnbull four, as occurring in "recent times." Undoubtedly there have been others which have never been recorded, but of the above none occurred with the A. C. E. mixture, nor have we been able to find a report of one.

It may be interesting to inquire why these mixtures have not been received with more favour by the profession, since their record is good, and in view of the high recommendation of the Chloroform Committee and of all the theoretical considerations in their favour. We find the explanation in two facts. First, the occurrence of a death at an early day, which is known as the "Crockett case."[1] Now, looking critically at the facts of that case, we boldly say that there is not a more flagrant instance of transfer of the effect of an operation to the anæsthetic than in this instance, and this is saying a good deal! The boy was five years old, a tumour was removed from his back which required for its removal two incisions "each nine inches long," the operation was stopped to ligate "a large artery," five other arteries were tied, the little fellow lost "four ounces of blood, certainly not exceeding six," and then vomited and died! The rapid loss of this amount of blood, the shock of such an operation in so young a patient, pass for insignificant, and the anæsthetic mixture has been paraded as the sole cause of death, and is so given in the latest work on anæsthesia! This is not justice, nor is it science. But that this case has exerted an immense influence in preventing and restraining the use of mixed anæsthetics we most firmly believe.

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[1] Medical Record.

[2] Sansom on Chloroform, p. 138.

The second explanation we adduce is the energy and persistency with which the fact of the unequal rate of evaporation of the various liquids which make these mixtures, has been pushed as an argument against their use. The plea has been that because the more volatile and safer liquids pass off first, the patient will, after a time, get the more powerful and dangerous one alone, when he is supposed to be getting the mixture. It would seem that such an objection is too trifling to have any weight, because it needs but to be stated to be recognized and avoided. The danger is not easily escaped perhaps, if the mixture be given by pouring it on a towel or napkin, the worst way ever devised for the administration of an anæsthetic, because certain to insure uncertainty as to the amount the patient may get at each inspiration, and as to the rate of his progress to unconsciousness; but if given from a sponge, a squeeze now and then. and a fresh addition of liquid, obviates the difficulty at once, and an objection is removed that has been urged, and repeated, and impressed as if it were of equal magnitude with the sudden and irregular action of chloroform.

More recently the strong feeling in the profession against chloroform, has led some who had used these mixtures, to abandon them. An eminent surgeon of the northwest lately stated to the writer that he had long and extensively used the A. C. E. mixture, and had never found cause for dissatisfaction, but that he had given it up solely under the influence of the feeling above alluded to. Our personal experience with this mixture has been such as to enable us to feel the full force of the point made by those who have used chloroform all their lives without accident. By dilution of the chloroform vapour there is no probability of producing death by cardiac paralysis, so prominent a feature of chloroform, while it is prompter in action, more reliable, and less unpleasant, than ether. That it is safer than ether, no one would maintain; that it is less safe remains yet to be shown. Undoubtedly the greater or less frequency of occurrence of dangerous symptoms, could they be ascertained, would be quite as good a test of the safety of an anæsthetic as the number of deaths. In this respect the mixture has been more favourable in our hands than ether in the hands of Dr. Kappeler: he was obliged to resort to measures of resuscitation three times in two hundred administrations. With the A. C. E. mixture we have been obliged to resort to them but once during some thirteen or fourteen years' constant use.

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[1] Am. Journ. Med. Sci., July, 1857.

The modification of the ordinary course of anæsthesia by the preliminary injection of morphia deserves attention. Resorted to first in man by Nussbaum, and its advantages shown about the same time by Bernard by experiments on animals, it has been the subject of numerous articles from time to time since, and has probably been used more in practice than would appear from the literature of the subject. It is claimed for this "mixed narcosis," that it is especially adapted to prolonged operations by rendering a far less quantity of chloroform necessary, the anæsthesia being continued with far less frequent repetition of inhalation, that the stage of excitement, both muscular and mental, is lessened, and that thereby the dangers of anæsthesia are diminished. Mollow, one of its enthusiastic advocates, goes further, and claims that the action of the morphia lessens irritability of the air passages and so restrains reflex action upon the heart, that in this respect its effect is similar to division of the *par vagum;* also that the morphia in small doses, increases the blood-pressure by its action on the motor ganglia of the heart, and by its contraction of the peripheral vessels, thereby opposing the chief deleterious influence of chloroform from the beginning, by presenting an opposition which must be overcome before the vascular pressure can sink below the normal. As to the smaller quantity of chloroform necessary for a given length of anæsthesia, the less amount of muscular excitement and the modified mental condition, Dr. Kappeler says "the advantages have been on various sides clinically proved, and are only seldom called in question."

There have been dissenting voices heard, however; among them, Demarquay, who claimed that the dangers of anæsthesia were by this method in no degree lessened—rather increased by the combination of two such depressing agents. If Mollow's claim as to the action of morphia be correct, of course this falls to the ground. The latest investigators of this method are Heiter and König, who have resorted to it with good results and warmly recommended it. As to danger König sees no difference between chloroform and morphia-chloroform narcosis.

Dr. Kappeler makes a very important contribution to this subject, and gives eleven carefully observed and recorded cases of the simple administration of chloroform and then of the mixed narcosis to the same patient, and almost all of the administrations for the same disease. We cannot omit presenting his conclusions in his own words upon so important a branch of the subject, conclusions drawn, too, from the use of so rare clinical opportunities. He makes the hypodermic injection from twenty to thirty minutes before administering the anæsthetic, and the time is not unimportant, as the stage of excitement is more probably increased than diminished if the one immediately precede the other. He states the amount of muriate of morphia used to have been for adults .015, for children .01.

"From this table, and a larger number of other chloroform-morphia narcoses, (about 150) it appears that the course of the anæsthetic with morphia is nearly the same as without it, that nevertheless the mixed narcosis is in general of a more peaceful character, that the stage of excitement is shortened, and the patient carried more rapidly and with less muscular action into the stage of tolerance. This difference is particularly marked in subjects more or less under the influence of alcohol. Passing to the individual symptoms it may be said that the reduction of the frequency of the pulse occurs in the mixed narcosis about the same as in the simple. Two cases of the table seem to show that the depressing influence of chloroform upon the action of the heart manifests itself less when morphia is combined with it; yet I saw lately, in the mixed narcosis, the patient a woman thirty-six years old, very dangerous symptoms on the part of the circulation, weak, irregular, intermittent pulse, with pallor of the face, so that the administration had to be stopped; and in my table of deaths from chloroform, there is a case of fatal syncope in which an injection of morphia preceded the inhalation. The temperature falls with and without morphia. The very frequent irregularity of respiration, amounting often to threatened suffocation, appears decidedly less frequently in the mixed narcosis. The dilatation of the pupils of the early stage of anæsthesia is frequently wanting when morphia is given. Muscular contraction is not present in the same degree as without morphia, and sensibility is abolished sooner and more completely, while vomiting is rather more frequent from the combined method. It is entirely certain that after a hypodermic injection of morphia, a greater effect is produced by the same amount of chloroform than without it; that is, a more rapid and a deeper narcosis is produced. The average smaller consumption of chloroform by mixed narcosis reduces somewhat perhaps the danger of the anæsthesia."

It appears reasonable that this process is especially adapted to one particular class of patients, nervous females or any patient looking forward with great dread either to the operation or the anæsthetic. Such powerful and depressing mental influence is the only explanation of the sudden deaths on the operating table before anæsthetics were known; it has been present in not a few of the deaths under anæsthetics. Such mental action is blunted and subdued by the narcotic, and the patient can then be gently conducted along a path which, without it, he could only travel with resistance and fear, if not horror.

It appears that none of the advantages of chloroform-morphia narcosis attach to ether-morphia narcosis. Dr. Kappeler gives his experience with twenty-five cases, the particulars of which it is not necessary to give, and this seems to show that in all respects the combination of these two agents is rather injurious than beneficial. Nor does an experience of seventy cases of ether-chloral narcosis allow him to speak any better of that combination.

Passing to the consideration of anæsthetics other than, and substitutes for, the two great ones, little time need be devoted to nitrous oxide. Its difficulty of preparation, and impossibility of transportation, unless with costly apparatus, prevent its use anywhere except in hospitals, and it is not adapted for general surgical practice. Long and severe operations, such as ovariotomy, have been performed under its influence, but not in sufficient number to establish its relative greater safety. The promptness of its action, the rapidity with which consciousness returns, and the absence of unpleasant symptoms afterwards admirably adapt it for brief operations, as extraction of teeth, while abundant clinical experience has shown it to be for such purposes safe, as safe probably as any anæsthetic will ever be found to be. Dr. Turnbull gives the statistics of the Colton Dental Association up to 1870 as 75,000 administrations, and those of the Drs. Thomas, of Philadelphia, up to 1879, as 58,400, making a total of 133,400, without a single death, and with not more than three in a thousand exhibiting unpleasant symptoms afterwards. Meanwhile it has its black list. Dr. Turnbull gives four cases, in one of which, however, the post-mortem examination revealed a cork, which had been placed between the teeth, in the larynx. Dr. Kappeler gives three fatal cases, one of which is certainly and the other probably in Dr. Turnbull's list. The third deserves record for some extraordinary features. It occurred to Nussbaum. The patient was a hard drinker upon whom perineal section had been performed. For the passage of a bougie he had taken chloroform *fifty-three times!* the fifty-fourth time he took nitrous oxide and never woke up! Deep cyanosis came on during the administration, and he died notwithstanding respiration continued for fifty minutes, and was maintained fifteen minutes longer by faradization of the phrenic nerves.

Especially adapted as is nitrous oxide for dental operations, and safe as it has been shown to be, the administration of any other anæsthetic by a dentist should be considered criminal.

The bichloride of methylene is scarcely in the field as a surgical anæsthetic. As it has never been manufactured and placed within reach of the profession in this country, there has been almost no experience with it here. Indeed it is difficult to obtain it anywhere pure, different specimens showing varying proportions of other ethers. The Anæsthetic Committee speak of it as "bichloride of methylene, so called, but as it has not a definite and constant boiling point, it is obviously a mixture."

This is well known to be the favourite anæsthetic of Spencer Wells, and his experience, extending to over 350 major operations, 280 of them being ovariotomies,[1] seems to justify him in speaking with great confidence of its merits. This shows conclusively that methylene can be successfully used for the severest operations, yet it proves comparatively nothing as to relative safety, for twice four hundred administrations is but a small number to test an anæsthetic. When it is added that other observers have not found this anæsthetic safe, and that the list of accidents from it is a large one, its use is not likely to be extended. Dr. Kappeler gives the details of nine deaths from it; two of them took place in the Moorfields Ophthalmic Hospital within two years. He details the experience of German surgeons with it, Nussbaum, Hegar, and Kaltenbach and Kocher, none of whom prefer it to other anæsthetics; and his conclusion is that "experience shows it to be as dangerous, if not more dangerous, than chloroform." This, too, is plainly shown by the experiments of the Anæsthetic Committee:

> "With frogs, it was found that the heart became quickly affected and soon stopped. With rabbits, respiration rapidly deteriorated and stopped while the heart was still beating. . . . As in the case of chloroform, the right ventricle became enormously distended—the first sign of paralysis being the commencement of this distension."

If nitrous oxide and bichloride of methylene claim and deserve but little consideration as surgical anæsthetics, two other anæsthetics have recently made their appearance as candidates for professional favour, one of them in England and the other in this country, which are now exciting the deepest interest and attracting the closest attention. The English article is the result of the study of the Anæsthetic Committee for some agent which would be free from the dangers of chloroform. They believe they have found it in the dichloride of ethidene ($C_2H_4Cl_2$, "an isomeride of ethene dichloride produced from aldehyde"). This they have found to yield the best results of all the articles experimented with. The mode and character of the experiments have already been spoken of, and here the results alone concern us. In rabbits anæsthesia was produced in four minutes, and cardiac action continued vigorously for forty minutes. Dogs were anæsthetized in from two to three minutes, and continued half an hour without failure of the heart's action. A most striking contrast was shown by changing the vapour of ethidene to that of chloroform. Under the latter

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[1] Diseases of the Ovaries.

"the right side of the heart began almost immediately to become distended and to be dark in colour, and the activity of the heart rapidly failed."

Ethidene is not free from the charge of reducing the blood-pressure, but it does not do it to the same extent as chloroform, and the reduction is "by regular gradations, and not, so far as observed, by sudden and unexpected depressions."

"Under the use of ethidene there was on no single occasion an absolute cessation either of the heart's action or of respiration, although they were sometimes much reduced."

Vomiting is sometimes produced by it, but whether more frequently than by other anæsthetics has not been determined.

The conclusion of the Committee is that although ethidene is not free from danger, it is in a very high degree safer than chloroform; that it is less exciting, more agreeable than, and as rapid in action as chloroform; and that "a very strong case has been made out for an extensive trial of it."

The experiments upon animals with ethidene seem to be very satisfactory, and the recommendation of this Committee is a strong passport to professional favour. The amount of clinical experience with it has not been large, but to begin at the beginning of this part of the subject we must go back quite a time in the history of anæsthesia. Ethidene was used by Snow as early as 1851, and his work on anæsthetics contains a chapter on it, under the title of the monochlorurretted chloride of ethyle, in which his clinical experience with it is detailed. He administered it for about seventeen operations, some of them of considerable severity, and from what he saw of its action formed a very favourable opinion of its merits. He says of it that "it resembles chloroform very much in taste and smell, and its physiological properties. Its boiling point is 149°; whilst that of chloroform is 140°; the specific gravity of its vapour is also lower; for these reasons it is considerably less volatile than chloroform, and it is therefore pretty certain that it would not be liable to cause the sudden deaths which have occasionally been produced by the administration of chloroform, even if it were given freely, and with no great care."

Difficulty of obtaining ethidene pure prevented Snow from using it to any further extent, and his last illness fell upon him even as he was writing the last paragraph of his chapter upon this article.

The second report of the Anæsthetic Committee is occupied with the detail of six cases in which ethidene was administered in various operations, most of them not severe, but in one, for the radical cure of hernia, the action of the anæsthetic was maintained for twenty-five minutes. In all its action was satisfactory, and the Committee does not hesitate to say that "it presents all the advantages of ether without any of its disadvantages."

Some other clinical experience with this article has been published in the British journals, all of it favourable to the new agent. Yet there is an opposite side to the account, although it has been so recently opened. First, theoretically, Richardson devoted a great deal of study to the different anæsthetics seeking a substitute for chloroform, and one of his statements of results is to the effect that "all the members of the group of narcotic vapours of the chlorine series are dangerous narcotics." This, then, must be disposed of by further study and observation. Second, and practically, Dr. Kappeler closes the page devoted to ethidene, and in which he speaks most favourably of it, with the following paragraph:—

"Unfortunately, the occurrence of a death from this article, in Berlin, destroys early the hopes which had been cherished of it, and will not permit of a more extended trial."

It is deeply to be regretted that no particulars of this case are given, and in the absence of them it is well to suspend judgment. The list of accidents from anæsthetics is full of cases in which the death is most unjustly charged to their influence and in which the vapour played but an insignificant part.

The other new anæsthetic, and the one which is just now receiving so much attention in this country, is of course hydrobromic ether, or the bromide of ethyl (C_2H_5Br). For its introduction into practice here as an anæsthetic, and for the impulse which has been given to its use and the study of it, we are indebted to Dr. Turnbull. The statement in his book that he "was the first to experiment with this ether upon man," we choose to consider as one of those slips of the pen which are constantly occurring to busy men when they write. Mr. Nunnely, of Leeds, England, used bromide of ethyl on animals as early as 1849, and his experience with it as an anæsthetic with patients was the subject of a paper read by him before the British Medical Association in 1865. Dr. Turnbull has been first to use it here, and to urge its good qualities and its adaptation to use for surgical purposes; and for his enterprise he deserves great credit, as he will receive due honour, should the article prove to be all that its friends claim and all that every one must hope it will prove to be,—as efficient, as reliable, as pleasant as chloroform—as safe as ether. Dr. Turnbull has been fortunate in finding a follower and able coadjutor in Dr. Levis, of Philadelphia, whose position has enabled him to give the article a more frequent use and a wider range of operations for trial. The experience of the former is given in his book, and amounts to seventy-one administrations, of which some particulars are detailed. Dr. Levis states his experience in a more general way, but no testimony could be stronger in its favour. He has "used it under the most varied circumstances which could be required to test the merits of an anæsthetic, . . . and in the most abnormal conditions of debility and shock of injury, in capital operations, through protracted periods of administration, in patients from early infancy to extreme old age," and has been so satisfied with its effects that he is impressed with the "conviction that it is practically the best anæsthetic known to the profession."[1]

The two leading peculiarities of bromide of ethyl are quickness of action and speedy recovery from the anæsthetic condition. The shortest time stated by Dr. Turnbull, in which anæsthesia was produced, was thirty seconds. Personal experience showed consciousness lost with three full, slow inspirations, and complete anæsthesia produced in a minute and a half, while consciousness returned in the same length of time.[2] Pleasantness of effect must also be given as a decided point in its favour; it is pleasanter to inhale than chloroform. As to the frequency with which vomiting attends its use, of Dr. Turnbull's twenty-one cases, in three this symptom followed, which is about fourteen per cent. Dr. Levis states that it occurs less frequently than after ether and chloroform. The state of excitement or struggling is stated by one of these gentlemen to be "short," by the other, "more moderate, brief, and transient than in the early stage of the anæsthesia of ether and chloroform." But upon this point the mode of administration has a powerful influence; mixed with air, as is the case with ordinary ether, the stage of excitement is violent and prolonged;[1] given pure and rapidly the above statements are probably correct.

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[1] Ethylization: Reprint from Medical Record.
[2] Cincinnati Lancet and Clinic, April 10, 1880.

The behaviour of the great functions of circulation and respiration is, of course, the great point in the study of a new anæsthetic, and in regard to these, under hydrobromic ether, we are sadly lacking in accurate information. Dr. Levis has not given any detailed account of administrations. He states, in general terms, "that the circulation generally shows evidences of moderate excitement, as indicated by some increase in the rapidity of action of the heart, and the pulse evinces greater general arterial tension." "The respiration is slightly increased in frequency until anæsthesia becomes complete, when it assumes the character of normal sleep." Of the fifteen cases given by Dr. Turnbull, with more or less detail, in nine no mention is made of these important functions, in one other the pulse is not given; while respiration is stated as not interfered with; in another, the pulse was "slightly accelerated," and the respiration is not mentioned! This leaves only four cases in which particulars of so great importance are given in a study of such a character as this! In one of these the pulse "was not influenced in the least," and the respiration was "slightly accelerated." In case 11 the pulse was, before the administration, 100, after first five inspirations 160, after operation 120. In case 13 the pulse was, before, 100, during the first eight minutes it was 160; the respiration 28, at sixth minute 30. In case 15 the pulse "advanced to 84," the respiration was "not interrupted." Cases 11 and 13 are notable for the enormous increase of the pulse rate, and they correspond with our personal experience, in every instance the pulse mounting in the first minute from about 80 to 120 and rapidly falling. It is singular that so marked a feature, occurring with certainty twice out of fifteen times, should not have occurred to Dr. Levis. How much we miss here the careful observation and minute record of individual symptoms of Dr. Kappeler!

This brings us to the consideration of an unfortunate case reported by Dr. Sims,[2] the only fatal case which has occurred after the administration of bromide of ethyl, a case which has been so prominently presented to the profession, and which has attracted so much attention, that no restatement of its particulars can be necessary. Only those need be looked at which bear upon the question of the safety or danger of hydrobromic ether. First, is the marked effect upon the respiration; it was very rapid, the patient breathed "sixty times a minute." In the debate in the New York Academy of Medicine, which followed the report of the case, another was mentioned (Dr. Little's second), in which "both the pulse and the respiration became exceedingly rapid." It is evident that Dr. Sims's patient did not die from any cardiac influence of the anæsthetic, and this is a point strong in its favour. The operation lasted an hour and a half, during all which time "her condition was good and her pulse was strong and full." We think it must be conceded that she did not die from shock or from any direct influence of the operation as the major factor; the time at which death took place, twenty-one hours after the operation, would militate against this, but more especially the marked symptoms present, of vomiting, pain in the head, and choleraic diarrhœa. She did not certainly die as she would have died from any other anæsthetic. A peculiar feature of the case was the scanty secretion of urine—five ounces and one drachm in twenty-one hours. As the kidneys, to the eye, appeared normal, and, under the microscope, revealed "acute catarrhal nephritis," the question arises whether this scanty secretion was an effect of the ether, of the condition of the kidneys, or an accidental occurrence.[1] Future observation and experimental research can alone decide. Many years ago, Dr. Emmet called the attention of the profession to the active part taken by the kidneys in the elimination of ether from the system, to the necessity of examining the urine before administering an anæsthetic, and to the great danger when disease of the kidneys exists.[2]

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[1] See Dr. Sims's first, and Dr. Little's second case, Med. Record, April 3, and Cincinnati Clinic, April 10, 1880.

[2] Medical Record, April 3.

Adding the general statement that hydrobromic ether has been administered with safety about two hundred times, and clinical experience is exhausted. Looked at carefully, it does not seem to justify the enthusiastic confidence in the safety of the agent which some of its friends show. The violent perturbations of the great vital functions of respiration and circulation would seem to enforce distrust of it; and that sometimes one and sometimes the other is affected looks like that irregularity of action and inconsistency of course which have banished chloroform from practice. The rise of the pulse rate from 80 to 120, or even to 160, within a minute, certainly suggests doubts as to a heart, at all diseased, bearing the strain.[3]

Theoretical considerations come up for examination, and are especially necessary so long as clinical experience is lacking. These are chiefly, or entirely chemical. If the dictum of Richardson in regard to the chlorine compounds be true, why would it not hold good for the bromine series? If we disintegrate compounds, and find them safe, in proportion to the innocuousness of their components, and *vice versa*, then an agent, into the composition of which bromine largely enters, can stand in no better, if in as good a position, as one containing chlorine. This was the line of argument pursued in the debate on Dr. Sims's case by Dr. Squibb, and its force is not easily escaped, while the facts he presented then, in regard to the chemical peculiarities of bromide of ethyl, its easy decomposition, and its loose molecular character, cannot but bear with very considerable weight in deciding the question.

Dr. Squibb acknowledges that he is prejudiced against hydrobromic ether. This feeling may influence his opinion, and give tone to his remarks, but cannot affect chemical facts. Yet a fuller and more accurate account of the chemistry of this article is now in order, is, indeed, a necessity, and the profession must look to chemists for it. But what is more urgently needed is a series of experiments upon animals. Those given in Dr. Turnbull's work are meagre beyond description, considering the importance of the subject, occupying less than fifteen lines. We want experiments conducted in the scientific spirit, and with the care and accuracy of the British Anæsthetic Committee. Respiration and circulation should be separated, as in those experiments, and then we shall be enabled to judge how frequently and to what extent each is affected by the inhalation of bromide of ethyl, and in what direction danger lies. Then further use of it with patients will have a scientific basis which it has not now, and until then, we do not think surgeons will be likely to use it for prolonged operations with Dr. Sims's case fresh in memory. For operations of brief duration the clinical testimony in its favour seems to fully justify its use.

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[1] *Scanty urine* was a prominent symptom after the administration of hydrobromic ether in a case reported by Dr. Donald Maclean, of Michigan, in Medical Record, April 24, 1880.

[2] Gynæcology, 2d ed. p. 746.

[3] [Since this almost prophetic paragraph was penned, a case of death while under bromide of ethyl has occurred in Dr. Levis' Clinic at Jefferson College Hospital. See current number of *Medical News and Abstract*.—ED.]

Our task has been executed during a period of greatly renewed interest in and study of anæsthetics; in regard to some the ink has scarcely dried before new facts were presented for consideration or statements had to be modified. This awakened interest in the subject and this rapid investigation of new agents attest at once the great importance of the subject and the earnest desire of the profession for a pleasant anæsthetic safer than any we now have. Such an one is not yet found. Every one must deeply regret that a death should have occurred to shake confidence in an article which promised a realization of our hopes. Yet when we reflect on the number of successful inhalations necessary to prove that a new anæsthetic is better than those already tried, the difficulty of the problem is appreciated; the new candidate must have been used thousands of times before it can rival chloroform or the mixed vapours, and tens of thousands before it can be compared with ether in regard to safety. Were this fact kept in view, there would be fewer journal articles and less dogmatism upon this class of remedies. Is it probable that a perfectly safe anæsthetic will ever be at our command? The time necessary for the proving of new agents makes this very improbable during the lifetime of those who saw the advent of ether and chloroform, and the retrospect we have made is not favourable to an affirmative answer. Disaster has followed the use of all, and the facts now will sustain Velpeau's statement as well as when he made it, and still justify Erichsen's words: "With every possible care it appears certain that the inhalation of any anæsthetic agent is in some cases almost inevitably fatal." The inference is that what has been so universally true in the past will be true in the future, however sad this may be to the philanthropist or to the enthusiastic surgeon. Unfortunately physiology teaches the same lesson: a state of artificial anæsthesia is a state on the borders of death.

The great practical lesson of all facts and all theory is that in the use of anæsthetics no precaution can be superfluous, no care too minute, and no watchfulness too great. J. C. R.

ART. XVI.—*Surgery in the Pennsylvania Hospital. Being an epitome of the practice of the Hospital since* 1756; *including collations from the surgical notes, and an account of the more interesting cases from* 1873 *to* 1878; *with some statistical tables.* By THOS. G. MORTON, M.D., and WILLIAM HUNT, M.D., Surgeons to the Hospital. *With papers*, by JOHN B. ROBERTS, M.D., and FRANK WOODBURY, M.D., late Resident Physicians in the Hospital. Prepared by direction of the Managers of the Hospital. 8vo. pp. 349. Philadelphia: J. B. Lippincott & Co., 1880.

"A HOSPITAL fulfilling its true mission is at one and the same time a house of mercy for the helpless and a school of science on which even the richest are dependent."

Has the Pennsylvania Hospital in its more than century long life fulfilled its true mission? That it has been a house of mercy for the helpless none will question. That it has been, and is, a school of science can as little be doubted, for its history is the history of the labours of nearly every one of those distinguished men who have, since the days of Rush and Physick, made Philadelphia the medical centre of the country.

Through the liberality of its Board of Managers, and the labours chiefly of two of its present staff (Drs. Thos. G. Morton and Wm. Hunt, Drs. John B. Roberts and Frank Woodbury assisting), there has recently been given to the profession a report of no little statistical and practical value upon the surgery of the house, based chiefly upon the carefully prepared case-records made during the last seven years, but presenting also many facts and figures taken from previous and less complete reports. All or nearly all of the ordinary surgical diseases and accidents, and some of the much rarer affections, are noticed in separate papers of varying length, giving the number of cases, their treatment, with its results, and, at times, rather full abstracts from the record-books. Some of these cases have been previously reported in medical journals, and certain descriptions of operations and instruments have already become familiar to the profession through published monographs and treatises. It is to be regretted that the authors, having done so much work, did not do a little more, and arrange their fifty-two papers so that those relating to kindred subjects should be found together; which, indeed, to a certain, but limited, extent was done.

The amount of material placed at the authors' hands was very great. For at least forty years there have been over a thousand cases annually in the surgical wards, and in this number a very unusual proportion of serious disease and extensive injury.

Ask any one what the Pennsylvania Hospital has been specially remarkable for, and the immediate answer will be "the number of its fracture cases and the methods and results of treatment." As might naturally, then, have been expected, fractures and their results have occupied no small part of the authors' attention in the preparation of the volume before us; and we find that about one-fifth of its 350 pages are taken up in treating of these subjects. Prior to May, 1878, 14,012 fractures had been admitted, one-half of them during the last twenty years. How have they been treated? Shock has been met and reaction induced by the administration of "small repeated doses of nutriment combined with quinine and coffee, with but little alcohol." Immediate adjustment of the fracture is the rule, subject, of course, to the ordinary exceptions; the patient being anæsthetized in some cases for examination and dressing. Incisions are freely made when the swelling is great, and "much stress is laid upon this measure." Two things are insisted upon: "first, the great importance of frequent inspection of the injured part; and, secondly, simplicity of apparatus." "Fixed dressings" are not favoured except in the late stage, "being never resorted to in the early stages of the treatment." Sodium silicate is generally employed; plaster of Paris, though "rather dirty in its application," being preferred where rapid solidification is required, *e. g.*, in cases of delirium tremens. Where else but in Philadelphia would plaster of Paris be put aside because of its being "dirty in its application"? What a trial of patience the "dry earth treatment" must have been during the years in which Dr. Hewson used it in the hospital!

Following the paragraphs on fractures in general are those upon special fractures, a few points in which may claim attention either for their statistical value or as showing the opinions upon various disputed points entertained by the surgical staff.

Seventy-three cases of *fracture of the spine* have been treated during a period of forty-four years; about seventy per cent. of which "are known to have died. Many others, doubtless, succumbed after being removed by their friends. . . . The treatment is always expectant. . . . If any deformity is detected an attempt at replacement is made, but no severe manipulation or operation, such as trephining, has been attempted as far as we are cognizant of the facts."

Fractures of the cranium have proved fatal in nearly one-half of the cases (146 deaths in 305 cases). The bromide of potassium in large doses and purgatives are generally relied upon to prevent cerebral congestion and inflammation. In cases of simple fracture with serious symptoms free exploratory incisions in the scalp are made, and "it is felt that too great stress can hardly be laid upon the importance of this exploratory incision in severe injuries of the head with suspected fracture of the cranium."

In the treatment of *fracture of the clavicle* Fox's apparatus continues to be largely used, though the "postural" treatment is acknowledged to be the best "when it can be enforced."

Fractures of the lower end of the radius are commonly treated with the Bond splint, Levis's new splint having been somewhat employed of late. The existence of "Barton's fracture" is stated to be recognized by the surgeons of the house with the exception of Dr. Levis, who "denies its distinctive character."

Fractures of the shaft of the femur are treated by extension and sandbags. "Measurement of the limbs in cases of suspected fracture, or as a means of determining results of treatment, is considered of value to a very limited degree . . . (and) has been almost discontinued, for there is no possible method of insuring accuracy when the injured leg may have been a half inch longer or shorter than the other before the receipt of fracture. Great attention is, therefore, to be given to the appearance of the thigh, and deformity avoided by accurate inspection."

In this connection notice may be taken of the paper by Dr. Morton, on *Asymmetry of Limbs*, in which (after presenting in brief a history of the work done by Dr. W. C. Cox and Dr. Wm. Hunt) he reports the results of the measurements made upon 513 boys at Girard College, 272 of whom "showed inequality of the limbs, and in 241 there was no appreciable difference." These measurements were made with an apparatus devised years ago by Dr. Morton.[1]

In the treatment of *fractured patella* Drs. Morton and Levis have for years past used a modified Malgaigne hook, and their opinion of such is evidently very different from that of their colleague, Prof. Agnew, who calls it an "infernal machine."

The "fracture-box" still holds its place as the favourite apparatus in cases of *fracture of the leg*.

Dr. Roberts has contributed quite a lengthy paper on *refracture* in cases of mal-union, believing it to be "the best method of correcting deformity, because it gives relief without suppuration, which is liable to follow drilling, and almost certain to result from the operation of excision." Eight cases are reported treated in this way during the five years from January, 1873, to January, 1878; the results being very satisfactory. It is, we believe, probable that subcutaneous division with saw or chisel will in the future be preferred, except in cases coming under treatment within a short time after union has taken place.

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[1] See American Journal of Med. Sci., Jan. 1877, p. 144.

One hundred cases of *ununited fracture and delayed union* are reported as having been under care in the hospital up to May, 1878; thirty-seven of which were operated upon during the last fifteen years, chiefly by drilling and friction. Only one death occurred, in a case of femur-fracture. The histories of several very interesting cases treated in the earlier years of the hospital, as recorded in the old case-books, are given in detail; among them the first seton-case of Physick in 1802, and the case of anchylosed hip-joint upon which Rhea Barton operated in 1826.

Since 1830, 1011 *amputations* have been made, 801 of them for accidental injuries. One in four proved fatal (24.43 per cent.). Respecting the immediate treatment of cases of severity necessitating amputation at once, Dr. Morton says—

> "We impress upon the resident physicians, who immediately attend to our patients upon admission, that the treatment of shock is of primary importance, *rest* being the great factor in bringing about reaction. The common practice of giving large amounts of stimulants indiscriminately in all cases, immediately upon the receipt of an accident, is wrong in principle, and should be condemned as not only inefficient but positively injurious. We avoid the use of alcohol, as a rule, and resort to it only in very exceptional cases."

It would be well if these sentences could become as household words to all, professional and non-professional. Just before operation—

> "of late years the rule has been observed to give, in all cases, a full dose of quinine. . . . The operation usually performed is that known as the skin-flap with the circular division of the muscles. . . . In knee-joint amputations . . . as the patella now and then becomes hypertrophied, and thus a source of irritation, we believe it safer in most cases to remove it."

The "Pirogoff" operation, resorted to whenever practicable, is seldom, if ever, employed in chronic cases, and rarely in patients over forty years of age.

The Esmarch bandage is believed to be

> "more especially useful in operations for the removal of necrosed bone, or where a careful dissection is made for the removal of tumours, etc., rather than for the arrest of hemorrhage during amputations. . . . The ordinary waxed silk ligature is usually employed in securing vessels; occasionally the animal ligature is resorted to, but rarely. Torsion was, at one time, quite commonly used by one of the former surgeons, but on account of the great loss of blood which so often took place before the closure of the vessel could be effected, and often secondary hemorrhage soon after the stump was closed, the method was not looked on with any favour."

Lately the Bonwill engine has been used in dividing the bone, and it is reported that "we think that the application of this apparatus for cutting through the bones in amputations will in time be more favourably received, for there is no doubt but that necrosis in stumps is frequently due to a clumsy saw and the consequent periosteal separation." Simple dressing is favoured, and the "open method" is stated to have yielded excellent results. "Oakum is always used in place of sponge, the latter having long since been entirely discarded."

The report shows most noticeable absence of septic diseases, not a single case of pyæmia having occurred during the past five years. This is believed to be

> "due to the very perfect system of forced ventilation by the fan, the scrupulous cleanliness of the wards, and the free use of carbolic acid in our dressings. In addition to this, our perfect system of dressing wounds with flowing water, dispensing with all basins and sponges from the wards, thus averting any possible

contamination, has been the sure means of ridding our wards of this most terrible of hospital diseases, and accomplishing the beneficial results referred to."

During the period from 1875 to (May inclusive) 1879, 108 amputations were made, death resulting in 17 cases. Among these 108 operations were 2 hip-joint amputations, 16 of the thigh, 39 of the leg, 6 at the knee, and 5 at the shoulder. Of the 29 patients upon whom 58 double amputations have been made since 1830, 6 died. Nine hip-joint amputations in all have been made at the hospital, four of which were reamputations. Three of these latter recovered, and one of the primary operations. A phototype is given of the successful reamputations, all of them made by Dr. Morton.

Burns and scalds, of which 160 cases are reported, with 36 deaths, appear to have been treated much in the usual way, no definite opinion being expressed as to the relative merits of the various remedies.

Arterial ligations number 43 (31 on account of aneurism, 11 for hemorrhage, and 1 for elephantiasis), of which 13 terminated fatally. It is both interesting and instructive to notice that of the cases of ligation of the subclavian (2) 50 per cent. (1) died, of the common carotid (9) $66\frac{2}{3}$ per cent. (6), of the external iliac (5) 40 per cent. (2), and of the femoral (19) 21 per cent. (4). The single case of ligation of the common iliac recovered, as also did that of ligation of the internal iliac. In the summing up on p. 45, it is stated that of the external iliac ligations *three* died, and of the *eighteen* femoral ligations four died; on p. 44 *two* deaths are credited to the tying of the external iliac, and *nineteen* femoral ligations are reported (two, however, on the same patient), both of which statements are shown by the table on p. 63 to be correct.

"In nearly all the operations the ordinary silk ligature has been used. As early as 1820 Dr. Parrish used a catgut ligature upon the anterior tibial artery. In four of the later cases, however, viz., two of the femoral, one external iliac, one brachial ligation, carbolized catgut was used. Deep abscess and sloughing occurred in one of these femoral ligations, followed by phlebitis and a fatal termination; the external iliac ligation also died; the other two did well. In two cases the aneurismal sac was punctured by a small trocar, and several feet of horsehair were introduced; both patients died of sloughing of the sac and hemorrhage. In no case has the injection of coagulating fluids been resorted to, nor has electro-puncture been performed. . . . Quite a number of the cases of aneurism have been subjected to compression, but for excessive pain in some cases, and inability to control the circulation as desired in others, this method, after varying periods of trial, was desisted from and deligation of the vessels resorted to. In three cases, however, good results were obtained; in two cases by mechanical and digital compression, and in the other by forced flexion of the limb. . . . The period occupied for effecting the cure in the cases of compression has varied from ten to thirty-six hours."

In two cases, *extirpation of the rectum* has been made for malignant disease. "The first case rapidly recovered from the operation, in fact had not a bad symptom, and obtained a new lease of life without even being annoyed with incontinence of feces. The second died a few days after the operation." Dr. Roberts, in commenting at some length upon these cases, notices the great difference among writers in the stated distance from the anus at which the peritoneum passes from the bladder or uterus to the anterior surface of the rectum, and very justly attributes these discrepancies to the manner in which the measurements were made. Few at the present day will take exception to the expressed opinion that "in selected cases the operation can be done with a reasonable hope of alleviating the distress of the patient and making life endurable."

Of *erysipelas*, sixty-five cases are reported (since 1873), sixty-two of which "were admitted for the disease." The cases were treated in the usual way (largely, it appears, with the tr. ferri chloridi), and five proved fatal; three of these latter being of the facial variety. In commenting on these cases, Dr. Hunt says:—

> "The record utterly fails to confirm the theory of any high degree of contagion in the disease itself, and if the contagious elements are in the shape of specific germ spores, upon the diffusion of which the spread of the disease is dependent, then these spores certainly neglected their opportunity."

Of *cancer*, seventy-one cases are tabulated, forty-eight of which were operated on. "In a few cases caustics were used, but there is no encouragement whatever to advocate the replacement of the knife by these agents. . . . Specifics are absolutely useless, both generally and locally."

Since 1870 seventy-two cases of *strangulated or incarcerated hernia* were admitted, twenty-seven of which were operated on, with a resulting mortality of nearly fifty per cent. "The radical operation for the cure of hernia is not now practised in the hospital. . . . The risk of the operation is so great, as also is the uncertainty of any permanent beneficial result following it, that we now prefer the well-fitting hard rubber truss."

Urethral strictures, of which fifty-five are tabulated, were very generally, it seems, treated by gradual dilatation, urethrotomy

> being "rarely resorted to. . . . The hospital is not without its experience in most, if not all, of the various methods of treating stricture that have been and are recommended. From time to time these are tried upon appropriate cases, and we think a just estimate is placed upon their value, but nothing has yet arisen in the way of improvement as to induce us to abandon the present prevailing treatment."

In the treatment of rupture of the urethra the catheter is removed after the first two or three days, being retained longer only "in very exceptional cases."

Twenty six cases of *tetanus* are reported, twenty-five of them traumatic. Of these six recovered, an unusual and certainly most gratifying proportion.

> "Five of them were kept under chloral in large doses, and one got well under the use of conia. . . . Among the most essential elements to success are isolation, dark rooms, and silence. . . . Nourishing food should be given at stated intervals, and in such a way as to cause the least possible disturbance."

Since the foundation of the hospital one hundred and thirty-three lithotomies have been made, with a total mortality of 14.28 per cent. (19); and nineteen lithotrities, with 10.52 per cent. mortality (2). (How much of the existing feeling on the part of American surgeons with reference to the latter operation is due directly or indirectly to the teachings and practice of Dr. Randolph in the amphitheatre of the Pennsylvania Hospital? Not a little, certainly.)

Of the large *joint excisions* twenty cases are tabulated, with five deaths (25 per cent.). Contrary to the view of surgeons in general, removal of the elbow is not favourably regarded.

> "We have on several occasions compared cases that have been treated in both ways, and we have mostly found that the anchylosed limb, provided that the proper angle had been maintained, was the superior of the other both as to strength and to control of movements."

Nor is excision of the knee-joint looked upon with much more favour; and that of the ankle is, in acute cases, altogether disapproved.

> "Amputate rather than cut out the joint. . . . The great risk of attempting to save limbs in severe compound injuries of the ankle-joint is strikingly illustrated. We think there is not one of the surgical staff who does not agree in saying that the more he tries the experiment the more he has occasion to regret it."

The short paper on *lacerations, wounds, etc.*, will prove of much interest to that large class in the profession who are frequently meeting with cases of such nature, and who almost as frequently ask, "What is best to be done?" Hot water as a hæmostatic has been used "of late with great satisfaction." In cases of gunshot wound (and this direction is especially applicable to wounds made by small pistol-balls), it is very properly advised to remove the ball if it can readily be found, if not to let it alone; "there is no need to increase the hazard to the life of the patient by undue perseverance in what often may be an unsuccessful effort."

Of the *germ theory* it is very briefly stated—

> "whether it will be fully established and recognized or not, remains to be seen, for it is much easier to theorize about it than to prove. . . . In the mean time, however, the practice of cleanliness and care as to both great and small matters that has arisen out of it is productive of much good. . . . There is one unfortunate influence that the theory in question has had, and that is, in inculcating the belief that the sources of all evil to the proper healing of wounds come from without. Hence the possible constitutional origin of local trouble is often lost sight of. In a surgical sense we learn fully to appreciate by practice that as to the human body alone 'all flesh is not the same flesh.' There is a flesh that heals and a flesh that will not heal, a flesh that ulcerates, a flesh that bleeds, and a flesh that sloughs. Weak central organs, diseased blood, vitiated secretions, and vicious habits may, and do, neutralize our efforts as well as bacteria and micrococci."

The use of sutures in cases of scalp wound is very properly advised. "There is nothing whatever to justify the old and deeply-rooted prejudice against sutures in this part of the body." Penetrating wounds of the chest are treated by immediate closure and fixation with adhesive plaster of the injured side. Early use of the joint in cases of sprain seems to be the custom, it being thought certain that anchylosis is thus often prevented. Aspiration of chronic abscesses is very highly commended. "Relief and cures are obtained by it very frequently, and its use, rarely, if ever, interferes with more positive measures, should they become necessary."

Quite a considerable space is devoted to the subject of *transfusion of blood*, an operation which has been made nine times, six times during the past five years; the mediate method having always been employed. In five of the six cases just mentioned, the operation though affording some relief, did not suffice to avert the fatal termination.

The several papers on *painful affection of the foot*, *elephantiasis*, *neuralgia and nerve-section*, although of much interest, can only be referred to. And the same must be said of the papers on *joint affections and injuries*, and *gynæcological cases and operations*.

In conclusion we cannot but express the pleasure that the perusal of the work under review has afforded us, and our sense of its value as a *résumé* of what has been and is being done in the oldest and best known hospital of our country; where the treatment of surgical disease and injury is at once scientific, conservative, and eminently successful; where the attending staff, certainly influenced, perhaps a little hampered, by the traditions of a century, are, as their predecessors ever have been, among the ablest surgical teachers and practitioners, the report of whose labours will command the attention and respect of the medical world.

P. S. C.

ART. XVII.—*Medico-Chirurgical Transactions.* Published by the Royal Medical and Chirurgical Society of London. Volume the Sixty-second. 8vo. pp. lxix., 473. London: Longmans, Green, Reader, and Dyer, 1879.

IN accordance with our custom we shall notice the medical and surgical papers in this volume separately. As analyses of many of these have already appeared in previous numbers of this Journal or in the *Medical News and Abstract*, which is accessible to all our readers, we shall not again refer to them.

Dr. GEORGE THIN, in his paper on the *Pathology of Lupus*, gives the result of his examinations of lupus tissues, which were undertaken with the view of determining, as far as possible, the nature of the so-called *giant-cells* described by Friedländer and others as of constant occurrence in the disease. A careful analysis of these objects (giant-cells), in their different stages and forms, has led him, he says, to form the conclusion that they are not independent organic structures, but that, on the contrary, the wall of the so-called cell is the altered coat of a diseased bloodvessel, that the appearance described as protoplasma is produced by a disintegration of red blood-corpuscles, that the nuclei on the periphery are nuclei of the vascular walls, and that the nuclei of the centre, when they are present, are the nuclei of colourless blood-corpuscles. He bases this opinion partly upon the fact that the dye eosin stains the giant-cells of lupus as deeply as it does the red blood-corpuscles, the striped and unstriped muscles and bloodvessels—tissues for which it has been shown to have a special elective affinity, and partly upon certain microscopic appearances, which we shall let him describe in his own words:—

> "If we search," he says, "for the early stage of development of the giant-cells in parts of the healthy or comparatively healthy tissue adjoining the lupus infiltration we find the following transition stages: Giant-cells are found in which the contents of the cells are homogeneous at one part and granular at another; others in which the contents are entirely homogeneous, whilst the wall and processes fulfil the characteristic requirements of the giant-cells, the nuclei, in this case, being limited to the wall, but still differing in no respect from the nuclei on the wall of the granular giant-cell. In some of these cells with homogeneous contents the likeness of the whole structure to a bloodvessel becomes apparent, and occasionally the wall is found to show the characteristic muscular coat of an artery. Going another stage backwards we find a giant-cell with homogeneous contents and red blood-corpuscles in the centre of the homogeneous mass—sometimes in considerable numbers—the wall and its relations still answering to the requirements of the giant-cell. In other sections of giant-cells we find the coats of the original bloodvessels still represented, the inner coat being represented by the nuclei of its endothelium, and the middle and outer coats by considerable thicknesses of characteristic tissue."

Instead of the expression giant-cell the author, therefore, proposes to substitute the term diseased bloodvessel.

The patient, whose history is related by Mr. HUTCHINSON, in his *Narrative of a Case of True Leprosy in which complete recovery has taken place*, was a woman, aged 71 years, who was born in England. When thirty-two years of age, being at that time in excellent health, she emigrated to Jamaica, where she lived eleven years. While there fish seems to have entered largely into her diet, a fact which tends to support Mr. Hutchinson's opinion that the malady is due solely to fish, and that its special cause is, probably, fish. After the disease had made some headway she returned to England and placed herself under Mr. Startin's care at the Hospital for Skin Diseases. Subsequently she came under the charge of Dr. Addison at Guy's Hospital. Drug treatment appears to have been of little service, and she soon left it off. Some improvement, however, followed the use of port wine and champagne. At the time of writing the patient is described as young looking for her years, but showing various conditions which have resulted from the leprosy. Her skin, although nowhere quite anæsthetic, except in the region of the right ulnar nerve, is in many parts deficient in sensation and dusky in tint. All tubercles have long since disappeared, and, both as regards skin and nerves, the author considers that reparation has taken place as far as it is possible. Her right eye is inflamed and the cornea ulcerated with deposit in its structure, and much persistent conjunctival congestion.

Dr. FREDERICK TAYLOR, in his paper *On the Condition of the Skin in Tinea Tonsurans*, gives the result of some microscopic examinations which he undertook for the purpose of determining whether the fungus upon which the disease depends is confined to the hair itself or whether it spreads into the structure of the root-sheaths and hair-follicles. The skin examined was obtained from the head of a child who had died of a tumour of the brain. Numerous sections were made from it, some of which were stained in logwood and some in picro-carmine. The result of his examinations are in favour of the statements of Küchenmeister, and opposed to those of Kaposi in reference to the implication of the root-sheaths. The hair-follicles, papillæ and root-sheaths, the cutis, subcutaneous tissue, and mucous layer of the epidermis, were entirely free, while the only parts invaded were the hair proper, and perhaps the horny layer to a slight and superficial extent.

Mr. GEORGE GASKOIN, in his report of *A Case of Morphœa*, makes some remarks in regard to the points of resemblance between this disease and leprosy, although he refrains from expressing a positive opinion as to their identity. The patient was an unmarried woman, of purely English nurture and extraction, aged 24, who, in addition to nodular masses on the face and chest, presented several maculæ of a "dark negro tint" on the arms and legs. Her health is said to have been always languid and disturbed but with no special ailment. Pain, anæsthesia, and pruritus, were scarcely or not at all observed, and there was only a trifling degree of local heat at times.

Dr. W. R. GOWERS contributes a long and instructive paper entitled *A Study of the so-called Tendon-Reflex Phenomena*. Under this designation are considered the two forms of muscular spasm first described by Erb and Westphal, viz.: 1. The movement which occurs under normal conditions at the knee-joint when the patellar tendon is struck. 2. The movement which occurs at the ankle-joint in certain forms of disease of the spinal cord when the extensor muscle and tendon are suddenly put upon the stretch.

In order to ascertain what are the variations in the knee-reflex under normal and abnormal conditions, Dr. Gowers examined 300 individuals, of whom 150 were not suffering from any paralytic condition of the lower extremities. Of these some were, as far as is known, in perfectly normal health, but the majority were the subjects of simple epilepsy. Of the whole 300 cases the movement was entirely absent on both sides in seventeen. Four of these seventeen individuals were suffering from locomotor ataxy, a fifth had atrophy of the optic nerves, and commencing ataxy was suspected. Of the remaining twelve, two were under treatment for paraplegic weakness of the legs, one had had an attack of right hemiplegia, one was suffering from mental disturbance and weakness with auditory nerve vertigo, one from tumour of the brain, and one from chorea, and six were epileptics. Almost all of them were poor walkers. In three cases only was the reflex absent in one leg, and present, although slight, in the other. In twenty-seven cases of hemiplegia from cerebral disease the reflex was equal in the two legs in thirteen of the cases, and unequal in fourteen. In the latter, without an exception, the excess of movement was on the paralyzed side.

In ninety out of one hundred individuals whose walking powers were reasonably gone, and who were examined with special reference to this point, the range of movement of the foot which could be excited by such a tap as ordinarily develops the maximum effect was found to be between one and three inches. The reflex was entirely absent in no patient with good walking power, although in four it was slight, not more than half an inch. In only six did it exceed three inches.

Dr. Gowers's next observations were directed towards determining the question whether the contraction of the quadriceps which follows the tap upon the patellar tendon is a true spinal reflex, or whether it is a simple effect of the blow on the tendon upon the fibres of the muscle, causing their sudden contraction. By means of a revolving drum, the writing-pen of which was attached to the foot, he was able to demonstrate that the muscular contraction occurs at such an interval after the stimulating tap, as, according to physiological data, would be needed for the processes involved in the necessary spinal reflex action, or, in other words, in about ten seconds, the shortest interval being nine seconds and the longest fifteen seconds. The tracing sometimes showed another interesting character, and that is a slight rise and a fall, often more considerable than the rise, between the stimulation and the movement which the author believes to be due to a slight contraction and subsequent relaxation of the muscles. The interval between them is not enough for the occurrence of a spinal reflex action; and there can be little doubt, he thinks, that they are the direct effects upon the muscular fibres of the blow on the tendon. The sudden slight tension upon the fibres causes a brief slight contraction, succeeded by relaxation, and followed by the strong contraction which results from the spinal reflex.

The visible phenomena being thus, those of a spinal reflex, the integrity of the path to and from the cord, and of the reflex mechanism in the gray matter of the cord, are necessary for its production; a damage in any one of these situations to the sensory fibres, the motor fibres, or the gray matter, may be expected to prevent its occurrence. Facts are in perfect accord with this conclusion. Thus: 1. The phenomenon is absent in most cases of locomotor ataxy, in which, as is well known, the region of the cord damaged is that, and may be that only, through which the fibres of the posterior nerve roots pass. 2. Damage to that part of the anterior gray cornu of the cord to which the quadriceps extensor is related prevents absolutely the production of the reflex. It is usually lost also in cases of atrophy of the lower extremities in which the quadriceps extensor is in any considerable degree involved, and often when its affection is slight, and this in cases in which there is not the slightest impairment of sensation. The reflex is lost, not only in ordinary cases of atrophy but also in pseudo-hypertrophic paralysis, especially in the latter stages of the disease, when the quadriceps extensor is always considerably damaged. In a few cases of locomotor ataxia the preservation of the knee reflex has coincided with such a slight degree of damage to the fibres of the posterior nerve-roots as does not involve appreciable loss of sensation. In some of these cases the lightning pains, which generally occasion so much distress in this disease, were also not as marked as usual.

To produce the ankle clonus it is only necessary to make a sudden dorsal flexion of the foot by pressure with the hand placed against the ball of the foot. This will make the tendon of Achilles tense and be almost instantly followed by a brief contraction of the gastrocnemius sufficient to move the foot and hand a little in the direction of extension, and this ceasing, the pressure of the hand being kept up, another similar contraction follows, and so on until the hand is removed. This phenomenon occurs commonly in those diseases of the spinal cord in which there is reason to believe that there is sclerosis of the lateral white columns, either primary or secondary to diseases of the cord higher up, or secondary to a lesion in the brain.

By means of the revolving drum, the writing lever being attached to the side of the foot, it was ascertained that the average number of contractions per second is nearly six, the variations being in the whole series of cases examined between five and seven, and that the average duration of each movement, and the interval between these contractions of the gastrocnemius, is about the sixth of a second.

In order to settle the question whether or not the ankle clonus is, like the patellar tendon reflex, of reflex nature, which its constant association with certain forms of spinal disease would seem to indicate, Dr. Gowers performed a series of experiments through which it will, unfortunately, be impossible for us to follow him. He found, however, that a contraction of the gastrocnemius could be produced by a gentle tap on the tendon of Achilles when the foot was only moderately flexed. The interval in this case between the stimulus and the movement was in most cases about .04 of a second, which is a period of time insufficient for the occurrence of a reflex process. "But," the author says, "whatever is the mechanism through which the single contraction is excited by the tap on the Achilles tendon, is certainly the mechanism by which the ankle clonus is excited." The conclusion therefore seems a necessary one to him that these clonic contractions are the result, not of reflex but of direct stimulation of the muscle by its sudden tension. It is true that the clonus occurs only in cases in which there is the strongest reason to believe that there are organic changes in the cord. But this fact is not evidence he thinks of its spinal origin, because it is quite conceivable that diseases of the cord either by the withdrawal or by the excitation of a central influence, may leave the muscles in a condition to respond in an abnormal manner to direct stimuli, just as we see the muscular fibres in progessive muscular atrophy quiver readily when struck. It is certainly not usual to regard this quivering as therefore a spinal reflex. J. H. H.

Next we turn to the surgical papers, and here as in the medical the opening paper is on Croup and Diphtheria. It is entitled "*Tracheotomy in Membranous Laryngitis*," and is written by Mr. ROBERT WILLIAM PARKER. If we may judge from this paper Mr. Parker is an acute observer, and a surgeon fertile in expedients. He proposes and figures three instruments which are both ingenious and valuable: one is a modified tracheotomy tube substituting a new and certainly a more accurate curve in the tube; another is an "automatic retractor" by which the edges of a wound may be held apart and an assistant be dispensed with; the third a plug to prevent contraction of the aperture when the tube is first removed and so form an obstacle to its re-introduction. The change in the curve of the tube is the most important and valuable, its objects being especially the avoidance of ulceration of the trachea by pressure. We also approve of the beveling of the end at the expense of the anterior wall, as it not only diminishes the danger of friction but materially facilitates its introduction without a plunger or guide. We note too with commendation that he advises anæsthesia, the use of large-sized tubes, the alkaline and steam spray and regular removal and replacement of the outer tube, or better still the use of two tubes in alternation. In fact the paper is full of useful hints.

In carrying out the after treatment he uses an extemporaneously inclosed bed, which is readily made, and is as efficient as it is cheap. Four wooden or iron rods are tied to the legs of an ordinary bed or crib. These are connected at the top by cross pieces and sheets thrown over all, leaving an opening for access to the patient and for light.

His systematic and, as it seems to us, rather harsh treatment of the trachea by frequent and repeated cleansing by "large feathers twirling them about in the trachea," or by a catheter, following the membrane even "down deep into the chest," is more doubtful; and we certainly do dissent from his closing dictum—"the presence of membrane in the trachea in a fatal case of membranous laryngitis after tracheotomy, must be regarded as evidence of want of due care on the part of the surgeon in charge, just as much as would the presence of a piece of gut in the inguinal canal after herniotomy, or a calculus in the bladder after the operation of lithotomy."

Mr. RICHARD BARWELL next describes *Three Cases of Distal Ligature of the Carotid and Subclavian Arteries for Aneurisms involving the Innominate Artery.* In the volume of Transactions preceding this he has already related a similar case, and given from other authors six additional cases. Adding the three now related, and one by Dr. King, of Hull, we have eleven cases in all, four of which have been done by Mr. Barwell, and of the three successes out of eleven cases all are his; surely a very unusual piece of good fortune—and good surgery. It is needless to give the operation and subsequent details save to note, besides the happy issue, the marked influence of menstruation for ill, the pulsation being greatly increased both before the operation and during recovery; that the operations were done antiseptically; and especially the small force used in tying them—a force of less than two pounds. Catgut was the material, and the little force used was the result of dynamometrical experiments, which showed that an E string of the violin would cut the two inner coats if tied with a force of three pounds, but none if with only two pounds. Mr. Barwell's cases are fully reported in the *Monthly Abstract* for 1879, p. 174.

As if to crown his name with added and well deserved lustre, Mr. BARWELL, later on in the volume, reports another almost analogous and, strange to say, successful case of *Deligation for Aortic Aneurism of the right Carotid and Subclavian Arteries, with a new species of Ligature.* The case fell into his hands, two months after the first paper was read, and soon afterwards he did this novel and interesting operation. His reasons for it are given at length. From the anatomy of the origins of the three great trunks from the aorta as well as from the character of the blood stream, as shown by the behaviour of emboli, etc., he divides the aorta into two great districts—the right and the left aortic districts divided "by a somewhat curved line running from the outer or right side of the aortic opening to the left carotid orifice," and if the portion of the aneurism can be defined in the one or the other district the corresponding vessels should be tied. The diagnosis is difficult and often impossible, but most important in those cases in which it can be made, by observations as to pressure on the bronchi, the sphygmograph, the venous congestion, the voice, the seat of pain, etc. He also refers to two cases preceding the present one in confirmation of his theory.

The unreliability and variability of catgut he shows is probably due to the fact that putrefaction in water is the first step in its preparation. In searching for a substitute the happy idea occurred to him "that the most fitting substance with which to surround an artery would be *arterial tissue*." Accordingly he procured the aorta from oxen, placed them in a three per cent. solution of carbolic acid, and cut from the middle coat *flat bands* for ligatures, this form being used to avoid cutting through the two inner coats. The details of its preparation are given, and the results of experiment on the lower animals showed that it was highly suitable for its intended use. The entire case is an instance of ingenious reasoning, well-devised experiment, and excellent surgery, crowned by its highest reward—an unexampled success. A full abstract of this case was published in the number of this Journal for July, 1879, p. 269.

Mr. W. B. DALBY next writes *On Disease of the Mastoid Bone.* Surely he should have said "Diseases," for it is scarcely fair to include malignant diseases, Mastoid Disease properly so-called, and necrosis of the entire temporal, under so misleading a title. The first case is a strong argument for the local origin of malignant disease. In March a woman æt. 32 picked her ear with a hair-pin and ruptured the tympanic membrane (soon after which Mr. Dalby saw her), an accident followed in a few days by suppuration, a month later by a polypus and facial palsy. In July the mastoid became involved with an appearance of malignancy, and she died in November from well marked cancer. Mr. Dalby has collected also six other similar cases with definite histories of a local origin, followed by cancer, without any apparent predisposition.

The case of mastoid disease proper follows the usual history, and happily ended in recovery as a result of trephining a month after the onset of the disease. One sentence in it should be well pondered—"I cannot but reflect that I have never, either in my own practice or in that of others, known the mastoid cells to be opened before it was needed."

Ophthalmic surgeons will be especially interested in a paper by Mr. JONATHAN HUTCHINSON *On Ophthalmoplegia Externa, or Symmetrical Immobility (partial) of the Eyes with Ptosis.* The name indicates ophthalmic paralysis or weakness of all the ocular muscles, so that the lids droop and the eye-balls become gradually limited in motion and sometimes absolutely motionless. In the last volume of Transactions a similar disease affecting the iris and ciliary muscles, through disease of the ciliary ganglion, Mr. Hutchinson has designated as ophthalmoplegia *interna.* In the present form of disease the internal muscles also are involved. Both diseases are probably closely allied to what is known as progressive muscular atrophy, and in many, if not most cases, they seem pretty clearly due to syphilis. Specific treatment produced marked benefit, but none were cured. Seventeen cases are given.

Mr. CHRISTOPHER HEATH contributes a very interesting paper *On the Diagnosis and Treatment of Ruptured Bladder.* The patient had been thrown down on his back by a companion, whose elbow hit him "in the stomach." He was sent to the hospital over twenty-four hours later by a doctor who had drawn a few ounces of bloody urine, with a diagnosis of hæmaturia and retention. Mr. Heath diagnosed ruptured bladder, and calls attention to the influence of the respiratory movements on micturition, an influence not visible when the bladder walls are intact. Abdominal section was performed at once by the antiseptic method, but the carbolic spray gave out before the operation was ended. The rent in the bladder was sewed up by a continuous catgut suture. He did well until the fifth day after the accident, and died on the sixth. Local peritonitis about the abdominal wound for two inches, six ounces of blood in the recto-vesical pouch, peritonitis in the coils of the intestines over it, and a gaping of the lower part of the wound in the bladder, were found at the post-mortem. Mr. Heath then discusses the various procedures proposed and the cases actually treated, both in England and the United States, including the methods of paracentesis, abdominal section (first proposed by Prof. Gross), catheterism both of the bladder and peritoneal cavity, lateral lithotomy (first suggested by Dr. Stephen Smith), and tapping the recto-vesical pouch. Four recoveries are cited, two by catheterism, one by abdominal section, and one by lateral lithotomy. The difficulty of sewing up the bladder, especially if the rent be posterior, as it is apt to be, is very great indeed, even with many and trained assistants, and as abdominal section has little if any advantage over paracentesis in evacuating the fluid, and is less effective in drainage than tapping the recto-vesical pouch, he rightly rejects it. His conclusion not only commends itself to common sense, but the method he urges is also simple and convenient, and can be done by every practitioner (a point of no small importance), viz., that cases of ruptured bladder should be treated so far as operation goes by catheterism and washing out, both of the bladder *and the peritoneal cavity*, reserving lateral lithotomy for the cases in which the catheter cannot be introduced through the rent into the abdominal cavity. If the practice needed any reinforcement it may well be found in the remarkable success recently reported by Mr. Keith in ovariotomy (97 per cent.), due largely, if not chiefly, to the fact that he *thoroughly* cleanses the peritoneal cavity as well as to the use of the antiseptic method.

Four papers out of twenty are on ophthalmic subjects, among them being next *Some Remarks on* 150 *Operations for Extraction of Cataract*, by Mr. CHARLES HIGGENS. He compares three methods of operating—the small flap section, linear section, and oblique corneal section, giving the merits and defects of each. His testimony as to the value of iridectomy is decided and very just. For the details we must refer to the paper itself.

Mr. J. W. HULKE relates a very interesting *Case of Secondary Trephining for Traumatic Abscess of the Brain with Recovery.* An errand boy, æt. 15, stumbled against an iron fence, grazing the forehead pretty deeply, but not to the bone. He continued at his work for a month, although suffering constant frontal pain. He then began to vomit, and soon afterwards to be more or less comatose. Seven weeks after the accident incomplete hemiplegia of the left side was observed. The pulse was but 48, and the temperature only 97.8° F. Mr. Hulke trephined and found a "small starred crack" in the outer table only of the frontal bone. After the dura mater was exposed and no pus found, a fine trocar connected with an aspirator was thrust in about an inch, disclosing greenish pus, and through the incision then made ℥iij–iv were evacuated. He recovered slowly and became both blind and epileptic. The latter trouble was cured, but the former persisted.

The paper *On Perforating Ulcer of the Foot*, by Mr. Wm. S. Savory and Mr. Henry T. Butlin is a *model* of what such paper ought to be. First, five cases are related in sufficient and accurate detail, with one coloured plate illustrating the disease macroscopically and two more microscopically; next the disease is briefly but satisfactorily described and its treatment considered; then its pathology is discussed, especially in the light of the facts revealed by the cases related, and finally a chronological bibliography from 1837 is given, including sixty-two separate titles. Among these are noted a few works inaccessible to the writers, and we observe among them, with some surprise in a great medical centre such as London, a number of Thèses de Paris, the "Medical Record," and the "Med. and Surg. Reporter." A specially commendable feature follows the bibliography, viz., a statement, again following the chronological order, of the new facts or opinions of each author, so that we can follow the current of medical opinion or discovery intelligently. All this is clearly and concisely done in the brief limit of eighteen pages. As to the disease itself, we can only point out that the authors have added to the proofs of its being due to a nerve lesion—a view but lately advanced.

Prof. G. M. Humphry relates a very interesting case of a *Tumour in the Bladder removed by Perineal Incision, with complete Recovery.* The patient was a man æt. 21, whose earlier symptom was intermittent hæmaturia, with pain and straining, but without casts or symptoms of stone. After some six weeks a firmish mass could be felt above the pubes and from the rectum. His pain and emaciation were so threatening that the lateral operation for lithotomy was done, and a tumour as large as an orange, with a pedicle as thick as the finger attached near the right ureter, was removed partly by the finger and partly by the forceps. Intense pain returned and continued for two months, so that it was presumed that the disease had returned; but he then began to mend, and after a month or so more he recovered and remained well after over a year. Mr. Humphry then gives in brief Billroth's well-known case (the only other similar case), and then discusses in general the subject of vesical tumours. He divides them into the papillomata, myxomata, fibromata, and the cancers, and studies the pathological anatomy of each. Finally, he urges in cases of serious or protracted and doubtful disease of the bladder, that perineal incision and digital exploration be more frequently resorted to. We cannot, however, refrain from hoping that with improved instruments we may soon be able to make such diagnoses by the urethra rather than by a serious operation.

The last paper we notice is *On the Movements of the Eyelids*, by Dr. W. R. Gowers—a paper of more than usual interest both to the oculist and the neurologist, and even to the artist. So far as we know, no one before Dr. G. has analyzed minutely the movements of the lids from a medical standpoint, and writers on artistic anatomy also have slurred it over in a sentence or two. One point Dr. G. has failed to note, although of some importance. He seems to have studied the movements of the eyelids exclusively on others. Many of them can be very well studied on one's self; but in doing so we must remember that, if only one looking-glass be used, the conclusions will be much modified by the fact that the reflecting looking-glass will occupy a very different position from the observer's eye, as it must move about with every change in the visual axis so that we can see our own eyes. *Two* such glasses should be used, one fixed on a level with the eye and directly in front of it, which will represent the observer, and a second movable one, which will reflect to us the image in the first glass. He has not only forgotten to call attention to the fact that the palpebral fissure varies considerably in width on the two sides in almost every person, but in noting the normal position of the lids we think he is clearly wrong. He says it "is such as to leave the cornea and iris unconcealed;" and again: "At the junction of the two [the sclerotic and cornea] is a depression which may be called the sclero-corneal sulcus, and in this, in most persons, the edges of the eyelids rest when they are separated." For the lower lid, when the eye is directed horizontally forward, this is an exact statement; but the edge of the upper lid covers a considerable portion of the cornea below the sulcus, sufficient to conceal the upper half or two-thirds of the breadth of the iris from its outer to its pupillary margin and sometimes even to this margin. And still later he says: "The upper lid follows the movements of the eye-ball, ... the edge being commonly maintained in juxtaposition to the edge of the cornea"—a statement still more erroneous, for the relation of the edges of the lid and of the cornea vary considerably in different positions. The two borders of the iris are the only perfect circles in the body, and it always produces an unpleasant effect artistically (an effect which, in spite of Dr. Gowers's statement, is fortunately rare) when the upper lid allows of its complete exposure.

The movements of the lower lid are first considered as they are the simplest. When the eyeball is at rest the lower lid is elevated by the orbicularis and falls by its own elasticity having been put on the stretch over the prominent cornea. When the eyeball is moved the lid follows the ball in its upward and downward movements, but the ball always gains on the lid in both directions. Depression of the lid is effected by the pressure of the prominent cornea, and elevation by the pressure of the lower convexity of the ball. It can be both seen and felt, and produces the same effect even in facial paralysis, which destroys the only muscular factor that might be supposed to effect this movement.

The movements of the upper lid are more complicated, as we have two muscles. Gentle closure, he states, is effected by contraction of the orbicularis, with a relaxed levator, and opening by the levator, with relaxation of the orbicularis; the recti, and therefore the position of the ball, being unchanged. In forcible closure the mechanism is the same, except that the superior rectus is in contraction instead of inaction. Here again we think his observation faulty. The normal attachment of the lids is below the equator of the eye and about on the level of the lower margin of the pupil. When the lids are even gently closed, the upper lid, as it were, hooks over the projecting cornea and so elevates the ball (*e. g.*, in sleep), and all the more so in forcible closure and without the action of the superior rectus. Moreover, while the lids are forcibly closed, the balls can be directed up or down as we choose. When gently closed, however, if we look down they are thrust open by the corneal projection, or if we look down with the lids open, it is almost impossible to close the lids without first elevating to some degree the eyeballs. His physiological reasons, therefore, for considering that there are two different centres—one for the gentle and one for the forcible closure of the lids, based on their different conditions in gentle and forcible closure—seem to fall, and the theory certainly does not commend itself to us on *à priori* grounds. Pathologically it is disproved also from cases of paralysis of the seventh, when the orbicularis is paralyzed. On endeavouring, no matter how forcibly, to close the eyelids, the levator is relaxed and the lid falls partially, but does not meet the lower one and so cover and wash the cornea. But with this, when the paralysis first occurs, there is no contraction of the superior rectus as called for on Dr. G.'s theory. It is a trick that is acquired by education ; the reason for its acquisition being the need of wetting the cornea by the tears in order to keep it transparent ; and as the lid does not fall so low as to hook over the cornea, the ball has to be lifted by the rectus.

Again, his statement that when the ball is depressed the upper lid can be raised "scarcely at all" is incorrect, for not only can it be raised, but a large margin of the sclera can be exposed—as large as when looking straight forwards, if not even more. His pathological arguments in favour of a different mechanism for elevation of the upper lid after closure, and for its elevation along with elevation of the ball, are better founded. He gives three cases of paralysis—one of double ptosis—to illustrate the fact that, while looking straight forwards the upper lids cannot be elevated, yet if the balls are elevated the lids are also. In the other two (illustrated) there is paralysis of the left third nerve and left inferior rectus, and they show that on looking down the lid falls on the normal side, though it does not on the paralyzed, the levator not relaxing; and yet, on closing the lids, the upper one falls in the natural manner, the elevator in this case relaxing naturally. W. W. K.

ART. XVIII.—*Japanese Health Reports.*

1. *First and Second Annual Reports of the Central Sanitary Bureau of the Home Department of the Imperial Japanese Government*, June 30, 1877. By Dr. NAGAYO SENSAI, Director of the Central Sanitary Bureau. Pp. 84 (with numerous tables).
2. *Report of the Director of the Central Sanitary Bureau to H. E. the Minister of the Home Department on Cholera Diseases in Japan during the* 10*th year of Meiji* (1877). By Dr. NAGAYO SENSAI, Director of the Central Sanitary Bureau.

1. THE progress of other divisions of the human family in what is called "civilization" has often been assisted by transplanting various improvements which together constitute the pre-eminent culture of the Anglo-Saxon; but few of these onward strides in the advancement of a race have been more remarkable than the one chronicled in the former of these essays.

That Japan should have the wisdom to prize, and the energy to pluck so ripe a fruit of our best nineteenth century development, as the Sanitary Bureau, is certainly a noteworthy event in the world's history, and should be pondered well wherever legislative authorities still delay the establishment of Boards of Health.

The volume before us embraces the period from the 1st of July, 1875, to the 30th of June, 1877, but a brief sketch of the Bureau from its inception is prefixed to the body of the Report. From this it appears that the Imukioku or Bureau of Medical Affairs was established in June, 1873, in connection with the Department of Education, and that one of its earliest duties was to draw up a preliminary sanitary code. This code was presented to the Dai-jo-Kwan (Central Government office) in December of the same year for approval, and consisted of seventy-six articles. Of these articles, 1 to 11 relate to the administration of the sanitary affairs of the Empire, to the organization of local sanitary offices, and to the appointment of their officers; articles 12 to 36 to the course of study to be followed in the medical schools; articles 37 to 53 to the examination of candidates for certificates authorizing them to practise as physicians and surgeons; and 54 to 76 to the examination of candidates for license to enter into business as apothecaries, and also special rules for the sale and handling of poisonous medicines and those which are of a powerful nature. At the same time it was suggested that since the proposed code was nearly identical with those of Europe and America, and therefore unsuited to the actual condition of country physicians, only a portion of its provisions should at first be enforced. In March, 1874, this code was ordered to be gradually put into operation in the three cities of Tokio, Kioto, and Osaka, and in the same month the Government Laboratory for sanitary matters was founded in Tokio. In June, 1874, a central office for collecting and keeping pure and effective vaccine lymph was established in Tokio, and in September of the same year regulations respecting compulsory vaccination were proclaimed throughout the Empire. In December, 1874, the selling or keeping adulterated quinia, or iodide of potassium was forbidden by special edict.

> "This order was given because, although circumstances rendered it impossible to at once prevent the importation of all kinds of either adulterated medicines or those of inferior quality, yet it was found to be absolutely necessary to take measures to insure that these two particular kinds of medicine should be good and pure, as they are most extensively used, and large quantities were continually being offered for sale either adulterated or of inferior quality. It was at the same time notified by the Department of Education to these cities that in the event of apothecaries being unable to distinguish the quality of any medicine they should be at liberty to apply to one of the government laboratories and have them analyzed without any outlay therefor to themselves."

In February, 1875, examination under government authority of all persons commencing the practice of medicine in the three chief cities was ordained, and in January, 1876, this order was extended to all the *ken* or prefectures of the Empire. About the same time examination of candidates for license to practise as apothecaries was enforced, and reports of deaths and infectious diseases were required of medical practitioners. In March, 1876, twenty other kinds of medicine were added to the list of those which must be kept pure and unadulterated, and in April of the same year the Home Department ordered that in certain cities and prefectures "a system for the inspection of public prostitutes was to be introduced in places where brothels existed." In the same month a magazine called the "Yei-sei-Kioku Zassi," a record of the Central Sanitary Bureau, was established in order to give the public a knowledge of sanitary affairs in Europe and America.

Dr. Nagayo explains that these various steps were taken in a somewhat irregular sequence, because at first only about 21 per cent. of the physicians followed the European system of treating disease, and even of this small number those who had received a regular medical education were only two or three out of ten, while all the rest were still adhering to the old Chinese and Japanese systems, so that it was necessary to gradually educate a body of medical men who had sufficient technical and scientific knowledge to carry out the provisions of the proposed sanitary code. As he wisely remarks, "the total change of the medical education of a country is a very difficult task, and results cannot reasonably be expected in a short time." That so much has actually been accomplished in so brief a period is perfectly wonderful, and indicates an almost incredible capacity for adopting and improving imperfect means as well as an equally stupendous executive ability in the ruling spirit of the Central Sanitary Bureau.

The body of the work is made up of special reports, the first of which, accompanied by elaborate tables, is that in relation to the rate of mortality and sickness. Table C, facing p. 20, shows the death-rate of the various cities and districts (except one prefecture) from the chief groups of diseases. The population, according to the census of 1876, excluding the district from which no report was received, being 32,812,116, gives a mortality per 1000 (not a per cent. mortality as indicated in the table) of 2.92 or 5.84 for the entire year. This extremely small death-rate shows, as admitted by Dr. Nagayo, that the returns are very incomplete, but they are nevertheless valuable in showing approximatively the relative frequency of causes of death.

The next report is in regard to Infectious and Contagious Diseases, which, it is stated, are well known and recognized by the people as extremely dangerous, although the utmost superstition prevails respecting the proper means of guarding against them.

> "The lower class still believe enchantments or supplications to the gods to be the only efficacious remedies. Therefore, when an infectious disease breaks out or is imported it often spreads without check over the whole country."

The third report, in regard to vaccination, informs us that it was the earliest sanitary measure introduced with great success into Japan, being first practised by Dr. Monnik, a Dutch physician at Nagasaki in 1849.

The fourth section treats of hospitals which differ from those in Europe and America in being chiefly resorted to by the wealthier classes. The first hospital in Japan was established by Tokugawa Shogun at Nagasaki in 1861, and there were in 1877 106 hospitals, of which 64 were public, 7 General Government Institutions, and 35 private. To these may be added 53 branch hospitals, lock hospitals, charitable hospitals for the poor, etc., making a grand total of 159.

Section fifth gives a brief account of the efforts towards "Prevention of Venereal Diseases and Inspection of Prostitutes," which until April, 1876, were confined to the sea ports of Yokohama, Nagasaki, and Kobe. According to the appended tables, it appears that during the year from July 1st, 1876, to June, 1877, there were examined in the two hospitals of Hiogo *ken* (city) and one of Tochigi *ken* 12,913 public women, of whom 1174, or 9.09 per cent., proved to be diseased and were placed under treatment.

Section sixth is devoted to "The Government Control of Medicines. (A) The control and examination of medicines in general. (B) Manufacture of medicinal chemicals. (C) Preparation and sale of patent medicines and of those whose composition is not publicly known." There are many points in this section worthy of note, approval, and even of imitation in our own country, but want of space forbids us to dwell upon them.

Section seventh, On Physicians, Apothecaries, and Local Sanitary Officers, informs us that in June, 1876, the number of medical practitioners in Japan was estimated at 23,284, of whom 21 per cent., as already mentioned, were practising medicine according to the European system. In the following year ending June, 1877, "the total number of physicians reported as practising in all cities and prefectures (prefecture of Kagoshima excepted) was 31,261, which bears a ratio of 0.91 to every 1000 of the population of the Empire. Out of this number there were 20,568 physicians following the Chinese system; 6602 the western (European), only 200 of whom were duly qualified by examination; and 4098 following the mixed system." This apparent increase in the number of medical practitioners was chiefly due to more complete registration.

The total number of apothecaries was returned during the year ending June, 1877, as 5993, of whom 22 had been licensed after examination; 16 of the whole number followed the Japanese system, 632 the Chinese, 35 the western, and 5288 a mixed system. The proportion of apothecaries was 0.17 in every 1000 persons, or 0.86 in every 1000 families.

The number of local sanitary committees appointed during the year ending June, 1877, was 321. Some of these were chosen from amongst the physicians and others from amongst the district officers to supervise sanitary improvements as extra duty.

Section eighth treats of the Analysis of Mineral Springs. Of these 674 are reported to exist, and 50 among them have been examined.

A valuable appendix, containing the text of various government notifications and instructions, is added, and contains many items worthy of favourable notice did space permit.

Although occasional orthographical errors and infelicities of diction may be detected by a critical reader, yet we cannot but acknowledge that, under the circumstances which surround its origin, the plan, the literary execution, the paper, typography, and press-work of this volume, being all such as would do credit to a government, a medical officer, and a publisher in London or in Philadelphia. combine to render it a marvel in the history of medical literature.

2. According to the author, Dr. Nagayo Sensai, the first Japanese record of Epidemic Cholera dates back fifty-six years, to 1822 of our era. This outbreak was so severe that members of almost every family were attacked, and in many instances all the members of a family were carried off. Several celebrated physicians of the capital (Yedo), after observing many cases, pronounced it true Asiatic cholera. This epidemic probably arose from cases imported on Dutch ships coming to Nagasaki from Java, where it had been raging.

A milder epidemic occurred about twenty years later; but another most serious outbreak took place in 1858, and lasted nearly three years. From the beginning to the middle of August, 1858, several thousand persons died daily, and the total number of deaths in Yedo at the end of August was estimated at over one hundred thousand. "In Nagasaki the people were quite in dismay; and they ascribed the general calamity to the opening of the country to foreigners."

In 1877, information of the prevalence of cholera at some of the Chinese ports being forwarded by telegram from the Japanese consuls at Amoy and Shanghai, on the 26th of July efforts were at once made by the Central Sanitary Bureau, under the direction of Dr. Sensai, to prevent the ingress of the disease into Japan again, by the establishment of quarantine and quarantine hospitals at all the exposed Japanese ports. The foreign office of the government decided, however, that this was unnecessary; but in about ten days two cases of true Asiatic cholera occurred in the *ken* (city) of Kanagawa in the persons of two women employed in a tea factory. They were taken sick whilst working with tea, and it seems probable that they were infected from "merchandise which had come from Amoy and was kept in the godown of the firm."

The first case in Nagasaki Hospital was that of a boatman who carried goods from and to the foreign vessels in the harbour. Another focus of infection seems to have been a cemetery in which a sailor who had died of cholera on board of a British man-of-war in the harbor was buried.

> "The epidemic of 1877," says Dr. Sensai, "was, I am glad to state, far less severe than any [either] of two plagues of 1822 and of 1858; but it remains still an open question whether the lives of the seven thousand eight hundred persons who died of cholera in 1877 might not have been saved if measures of medical inspection had been adopted at the open ports at the time of the receipt of the telegram from our consul at Amoy, when there had not yet been one case of cholera reported in our country."

The spread of cholera is traced from one city and prefecture to another with careful minuteness, but the disease appears to have been only moderately severe, and the cases infrequent until about 1st of October, when it became very violent among the soldiers returning from suppressing an insurrection in the province of Kagoshima. Six soldiers, for example, died upon the steamer "Wakanoura" on her way to Kobe; fifty were nearly dead on her arrival, sixteen died in the boats whilst they were going to land, and forty new cases broke out after the landing. Efforts were at once made by the Central Sanitary Bureau, to have the land travel of the returning soldiers stopped, and to secure the inspection and detention of diseased soldiers and others. These judicious precautions being inaugurated, the rapid extension of the disease was soon checked.

From Dr. Sensai's general conclusions we extract the following, which appear to be the most important:—

1st. The period of greatest prevalence was from October 1st to November 1st, 1877.

2d. Nagasaki, Kanagawa, Hiogo, Osaka, Kumamoto, and Kagoshima suffered most severely. In them the death-rate during the epidemic was from 10 to 61 for every ten thousand of the population and from 39 to 80 of every hundred persons attacked.

6th. A general diffusion of the disease over a population of 32,512,155 occurred without causing a great epidemic.

7th. The total number of persons attacked was 13,710, and that of those who died 7967, or 399 cases and 246 deaths for every 10,000 inhabitants. (This high death-rate of 58 per cent. is probably only apparent and due, we suppose, to failure to report many of the milder cases.)

8th. Nearly three times as many males as females were attacked.

Excellent official instructions in regard to the establishment and subsequent management of quarantine stations, cholera hospitals, etc., and a short but admirable paper on the use of disinfectants in cholera epidemics for purifying discharges from the sick, clothing and bedding, water-closets, hospitals, ships, etc., are appended to this report, which altogether forms a valuable addition to the literature of cholera as well as that of Hygienic science. J. G. R.

ART. XIX.—*De la Lésion des Organes Urinaires pendant l'Opération de l'Ovariotomie*, par M. le Docteur G. EUSTACHE, Professeur de Clinique chirurgicale à la Faculté libre de médicine de Lille, etc.

On Injury of the Urinary Organs during the Operation of Ovariotomy. By Dr. G. EUSTACHE. 8vo. pp. 32. Paris: J. B. Baillière and Son, 1880.

THE author divides the subject into three heads: wounds of the kidney, ureter, and bladder. *Wounds of the kidney* from its location are very rare, and but one case is cited, where, according to Mr. Spencer Wells, the kidney being strongly adherent to the tumour was removed with it, and the patient died. Cyst of the kidney has been three times mistaken for ovarian cyst, and the organ removed, after the disease was finally recognized. The cases quoted are those of the late Dr. E. R. Peaslee, of New York—woman died in 55 hours; of Dr. Meadows, of London—patient died of hemorrhage on the sixth day; and of Dr. Schetelig, whose patient having but the one kidney, died the day after its removal.

Lesions of the ureter are quite rare, and particularly so where the cyst is a true ovarian. Where the broad ligament is the seat of a parovarian cyst, the ureter is in greater danger. Prof. Eustache gives three cases of injury.

1. 1869. The late Dr. Simon, of Heidelberg, having accidentally cut the left ureter in an ovariotomy, removed the corresponding kidney, and the patient recovered.

2. Dr. Von Nussbaum, of Munich, in his ninety-sixth ovariotomy accidentally injured the right ureter, resulting in a urinary fistula. This he cured by ingeniously re-establishing the connection between the kidney and bladder.

3. Dr. Tauffer, of "Freibourg-en-Brisgau," met with the same accident in extirpating a parovarian cyst, and re-established the ureter in the way practised by Nussbaum.

Lesions of the bladder are much less rare; not that this viscus is in danger because of adhesions, for these seldom form, as it is external to the peritoneal cavity, and not inclined to become adherent to the cyst as an effect of inflammation. The situation of the bladder is its chief source of danger as it may be distended or elevated so as to be clamped or incised. It was wounded on one occasion by the author, which directed his attention to a line of research that has resulted in the production of the monograph under review. Ten cases are reported, the last being his own.

1. M. Péan, Paris. This was not properly a case in point, as the operation was a hysterectomy and not an ovariotomy.

2. Tauffer, of Fribourg, removed two ovarian cysts which were strongly adherent to the abdominal parietes and pelvic organs. On the eleventh day there were symptoms of suppuration, and pus escaped on the sixteenth

day by the abdominal wound. An attempt to drain this through the vagina by puncturing the anterior cul-de-sac, resulted in a wound of the bladder which closed in eight days.

3. Henry Smith, of King's College, reported a case in which the bladder was opened after the separation of pelvic adhesions in an ovariotomy: the woman died. He attributed the opening of the bladder to ulceration.

4. Spencer Wells once pinched the bladder in clamping a pedicle, and the urine subsequently escaped by the abdominal wound. The woman died; but this was attributed to other causes.

5. Knowsley Thornton met with the same experience in using the clamp, but it was fortunately removed and replaced before cutting the pedicle, and no sutures were required.

6. Granville Bantock reports a case where the ovarian cyst had formed extensive adhesions to the pelvic organs, abdominal parietes, and posterior surface of the bladder, even adhering to the symphysis pubis. The bladder was opened an inch and a half in making the separation; was sewed up, and the uterus secured against it, both surfaces having been torn in the operation. The patient did well for several days, and finally died of strangulation of the bowels by a false membrane.

7 and 8 by the same. In 7, the bladder was torn and immediately sutured, the case was otherwise desperate and died. In 8, the bladder was cut, it not having been well emptied, but not entirely through. It was at once sewed with fine carbolized silk, and the patient recovered without any vesical symptoms.

9. Spencer Wells in one case discovered urine escaping in the incision, and found an abnormally developed urachus extending to the umbilicus. He secured this in the abdominal sutures, and the patient recovered.

10. The author's case. Owing to extensive adhesions, and an abnormally elongated bladder, this viscus was opened at a point $4\frac{3}{4}$ inches above the symphysis, and $1\frac{1}{4}$ inches in length. Although much urine escaped into the abdominal cavity, its careful removal, suturing the bladder with catgut, and the continual use of the catheter caused the woman to make a good recovery. The catheter was worn five days, the patient was then directed to urinate every four hours. She was up in two weeks and out in a month.

Although a good English scholar, Dr. Eustache makes an error on page 8, in reference to Dr. W. H. Byford's second Cæsarean case, in these words, "having incised a gravid uterus during an operation of ovariotomy, and not being able to control the hemorrhage, decided at once to practise ablation of this organ." Dr. Byford punctured the uterus with a trocar, under the impression that it was a second cyst; and finding the young lady illegitimately pregnant, performed the ordinary Cæsarean section to save her life. Child $7\frac{1}{2}$ months, dead; woman recovered.

Dr. Eustache is the author of a number of monographs, and being a good linguist, is enabled to secure unpublished records by correspondence, thus adding much to their value. In the paper under review, several of the cases were thus obtained, and for this reason we have thought proper to reproduce them. Ovariotomies are so frequently performed, that it is remarkable, that so few instances of injury to the urinary organs are said to occur. It is evident that great caution is required, when such operators as Spencer Wells, Thornton, and Bantock have met with accidents in their cases. R. P. H.

Art. XX.—*The Hypodermic Injection of Morphia. Its History, Advantages, and Dangers. Based on the Experience of 360 Physicians.* By H. H. Kane, M.D., New York. 12mo. pp. 354. New York: Charles L. Bermingham & Co., 1880.

We well remember to have heard the late Dr. William W. Gerhard say in his clinical lectures at the Pennsylvania Hospital, that few physicians learned how to use opium until after they had killed two or three patients by it. This statement is, we are willing to believe, an exaggerated one; it served, however, to impress upon us, and doubtless upon other members of the class, the necessity for caution in prescribing this drug. This little book of Dr. Kane will also answer a good purpose by calling attention to the fact that the hypodermic administration of morphia is a procedure not entirely free from danger, and one, too, which is not to be resorted to in every case.

The author draws the material for his book, principally from the answers furnished by physicians both in this country and abroad, to a series of questions which he addressed to the profession, generally through the medical journals. These questions have reference chiefly to the dose employed, the supervention of inflammation or abscess at the point of puncture, the occurrence of death or other accident, and the contraction of the opium habit as a consequence of the administration of morphia hypodermically. It is rather amusing in reading the volume to note the various reasons given by different observers for the occurrence of abscess. Thus one physician attributes his immunity from this accident to the fact that he inserts the needle of his syringe deep into the muscles, while another asserts that this is the way most certain to bring it about. Others refer it, and with more reason, to a debilitated condition of the patient, or to the use of needles which have been allowed to become rusty, or foul from want of proper cleansing, rather than to any special method of making the injection.

Dr. Kane's correspondents give him the histories, in more or less detail, of 36 cases, in which death occurred after the use of morphia hypodermically, and was apparently attributable to it. He has heard also of several other cases of which he has not as yet been able to obtain the particulars from the gentlemen in whose practice they occurred. In a number of these the fatal result cannot be regarded as due in any sense to the operation, and in others it is, at least, doubtful if it were so produced. There remains, however, a sufficient number of cases to teach us caution in the use of the hypodermic syringe. In one case death followed the injection of one-eighth of a grain during an attack of *delirium tremens*, and in others fatal narcotism was produced by one-sixth of a grain. Other cases are adduced to show that intemperate persons bear morphia badly, and that the same is true of patients with contracted kidneys. Attention is also called to the necessity for care and circumspection in administering morphia hypodermically to patients, who have taken it within a short time by the mouth. In one or two cases which are referred to by the author, absorption by the stomach seemed to have been delayed until after the injection had begun to exert its influence.

The book is evidently the result of much labour, and its author deserves credit for the pains he has taken in collecting information on all points bearing upon the hypodermic administration of morphia. He is, however, needlessly diffuse, and he has, perhaps, made a mistake in not adhering to his original intention of embodying the results of his investigations in two or three interesting journal articles. J. H. H.

Art. XXI.—*Skin Diseases, including their Definition, Symptoms, Diagnosis, Prognosis, Morbid Anatomy, and Treatment. A Manual for Students and Practitioners.* By Malcolm Morris, joint Lecturer on Dermatology at St. Mary's Hospital Medical School, etc. With illustrations. 12mo. pp. 320. Philadelphia: Henry C. Lea, 1880.

This book was written, the author states, to supplement, not supplant, existing treatises, which should mean for the purpose of furnishing to the student and practitioner later information than other works at their command contain. It is perhaps true that the demand for such an undertaking existed among that part of the profession in Great Britain which is unacquainted with the foreign literature of the subject, but the recent publications of Neumann, Behrend, and Kaposi in Germany, and of Duhring in this country, left nothing untouched which this work supplies, and represent, indeed, a wider field of experience. The book, to be judged fairly, therefore, must be considered on its own absolute merits. It may be described as a very fair representation, on the whole, of the German school of dermatology, very brief in some parts, and more or less modified in others by the individual views of the author's English teacher, Mr. Hutchinson. As a manual of cutaneous therapeutics, it may at once be said, it is a failure. If the considerable space devoted to the chapters on the exanthemata, typhus and enteric fevers, diphtheria, equinia, etc., which are more fully treated of in all general and accessible works on medicine and surgery, had been used for such full and explicit directions for the treatment of skin diseases proper, as are alone of any value in the management of these affections, we could recommend the book more warmly to the practitioner. In some respects it is excellent, especially in the pathological anatomy of individual diseases.

The introductory chapter on anatomy and physiology, founded mainly on Biesiadecki's article in Stricker, is a simple and satisfactory sketch, well illustrated. It is a pity that the author felt the official necessity of inventing a new plan of classification. We cannot regard it as an improvement on the pre-existing work of the masters in dermatology, and it is strangely confused in some parts. For instance, syphilis is included among the exudations; herpes is an exudation, but zoster is a neurosis; many of the keratoses are classed as neoplasmata, not as hypertrophies.

It is not our purpose to criticize the author's views respecting the individual affections of the skin. They are treated of very unequally and in many instances far too briefly. His account of eczema, for example, is admirable in many respects, clear in description and diagnosis, but its treatment is disposed of in three pages. His management of psoriasis requires little more than a page, but in this space there is room for the following statement, which is at least misleading: "Though the employment of local treatment without any internal remedy does remove the external appearance of the disease, a real cure is not effected on account of its liability to return. Both modes of treatment should, therefore, be adopted at the same time." This implies that internal treatment may effect "a real cure," or that it is more likely to do so than the external. We know of no data which warrant such an opinion. Again, the treatment of one of the most distressing and difficult affections to manage—pruritus—is presented in eleven lines. In conclusion we must express regret that a work which possesses many merits should fail in important respects of fulfilling the purpose for which it was undertaken. J. C. W.

ART. XXII.—*Thirteenth Annual Report of the Health Department to the Honourable Common Council of the City of Cincinnati, for the year ending December* 31, 1879. By THOS. C. MINOR, M.D., Health Officer. 8vo. pp. 311. Cincinnati, 1880.

THIS is a new departure in the form of Health Reports, and merits special attention from all who are interested in such documents, as well as from a large number who are not, but who ought to be. Dr. Minor has taken the schedules of questions issued by the National Board of Health for the purpose of indicating what is desirable in the sanitary survey of a city, embracing twenty-one different subjects, and, taking up each question seriatim, has briefly answered or discussed it, the whole making a connected report of a "Sanitary Survey of Cincinnati."

The result is a document which is a model of its kind, and which is not only of much interest and value at the present time, but will, for years to come, be referred to for information on the several subjects on which it treats.

It forms an interesting contrast to a book published sixty-five years ago which had the same general object. This work, which is now rare, is the "Natural and Statistical View or Picture of Cincinnati and the Miami Country," by Dr. Daniel Drake, published at Cincinnati in 1815, which, as the author says, is "an account of a village in the woods." Dr. Drake had to consider the sanitary relations of a town of 1100 houses, containing about 6000 inhabitants. Dr. Minor deals with a city having about 45,600 houses, and a population of nearly 300,000. The system of hauling water from the river in barrels, and allowing it to settle, described by Dr. Drake, has given place to elaborate water-works, with an average supply of 17,000,000 gallons per day, and the open ditches of old time are now large and expensive sewers.

This change is not, however, an unmixed good. The outlet for the whole sewer system is the river in front of the city, but this system has only been adopted within the last five or six years, and a large part of the city lies above the water-works. From the description it is clear that the water-supply is becoming more and more contaminated with the excreta of this part of the city, which has no sewers; but Dr. Minor's somewhat cynical remark is no doubt correct, viz.: "Owing to the lack of public interest in the matter, no steps will probably be taken to obviate the growing evil until an epidemic visitation, directly traceable to a contaminated water, shall occur, and a few hundred lives be sacrificed."

In connection with this part of the subject a reprint is given of a rare document of much interest, being the report on the Ohio River water, made for the City Water-Works in 1856, by Prof. Locke.

Space is wanting for anything like an analysis of the Sanitary Survey, and this is the less desirable since the information is already stated as briefly as is consistent with clearness.

Every municipal health officer should obtain a copy, and "go and do likewise." Especially should this be the case for those towns which are just beginning to pay attention to sanitary matters. The time is not far distant when every city in this country will feel the need of some such record as this. No doubt it might be improved; the preparation of such a document is a capital means of finding out what one does not know; but the first step towards supplying deficiencies is to discover them.

From such an "account of stock" as a starting-point, it will be easy to keep the sanitary books well posted up, and to mark the progress which will be made. The publication of such a document as this is also one of the best means of educating the community as to the necessity which exists for guarding against those special causes of disease due to the collection of large numbers of men on limited areas.

The possibilities of public hygiene depend on such education, and to promote it should be one of the main objects of health authorities, whether municipal, state, or national; for without it they have no firm foundation in a country having either a republican or a democratic organization.

J. S. B.

ART. XXIII.—*Montreal General Hospital. Reports, Clinical and Pathological, by the Medical Staff.* Edited by WILLIAM OSLER, M.D., M.R.C.P. Lond. Vol. i. pp. xxii., 367. Montreal: Dawson Bros., 1880.

THERE are two large hospitals in Montreal—the General Hospital and the Hotel Dieu. The former derives its patients chiefly from the English-speaking portion of the community, and has 170 beds, but during the last two years the income of the hospital has been insufficient to keep more than 140 of them constantly occupied. Still the opportunities for observation afforded by it must be more than fair, since 1600 patients are annually treated in its wards and 15,000 at its dispensaries. It enjoys, moreover, the enviable distinction of being the first institution in Canada to publish a volume of Reports. The volume has, moreover, claims of its own upon the favour of the profession in the general excellence of the papers contributed by the members of the medical staff, who, we hope, may meet with sufficient encouragement to justify them in issuing, as they propose, other volumes from time to time. The medical papers are more numerous than the surgical. We shall call attention to them first.

Dr. R. P. HOWARD, who reports four *Cases of Leucocythæmia*, is already well known to American readers through his paper on Pernicious Anæmia, published in the "Transactions of the International Medical Congress," held in Philadelphia in 1876. In three of his cases the patients were males and were under sixteen years of age. Indeed one of them was an infant of only eight months when it came under observation. A post-mortem examination was made in two of the cases, one of them being that of the infant already referred to. Particular attention was paid to the examination of the marrow of the bones, which was found to present in a high degree the changes which have been of late attributed to a hyperplasia of this structure. The author is, however, disposed to regard these changes as the consequences rather than as the causes of the disease, and for the following reasons: 1st. He is not aware that an unexceptionable instance of primary myelogenous leucocythæmia is on record. 2d. These changes are never met with in an early stage of the disease. 3d. They are present in various other conditions, as for instance in Hodgkin's disease, or pseudo-leucocythæmia, in pernicious anæmia, in Addison's disease, and in chronic diseases attended by marasmus, as, for example, phthisis. They have also been met with in tubercular peritonitis, and in osteo-myelitis experimentally produced in animals. He also agrees with those who deny that the medulla of the bones is concerned in the development of the white corpuscles of the blood, and maintains with Dr. Moxon and Dr. Schtschastny, of St. Petersburg, that the lymphoid cells found in the bone-marrow in leucocythæmia are leucocytes which have escaped from the bloodvessels.

Nucleated red corpuscles were found in the blood of all the patients. This would appear to be exceptional, as Mosler has never seen them in leukhæmic blood. In none of the cases, however, were they present in large numbers; indeed, in one of them a single one only was found after prolonged examination. On the other hand, no microcytes were detected, although they have been occasionally met with in this disease by other observers.

The *Medical Cases* reported by Dr. GEORGE ROSS are, 1st. *Case of Extreme Dilatation of the Stomach.* 2d. *Case of Cirrhosis of the Liver, with great Enlargement.* 3d. *A Case of Athetosis, or Unilateral Slowly-moving Spasm.* 4th. *A Case of Acute Spinal Paralysis in an Adult* (*Poliomyelitis Anterior Acuta*). The patient in the first case was a woman aged 37 years, who up to five months before her death considered herself in perfect health. At that time she began to suffer from dyspeptic symptoms, especially from a squeezing sensation at the pit of the stomach. Later nausea and vomiting, with a "burning" in the stomach, occurred. When she came under observation the stomach was found to be enormously dilated. When deep pressure was made below and to the right of the umbilicus, a small, rather firm, and somewhat irregular lump, apparently occupying the seat of the pylorus, could be made out. After death the stomach was removed from the body and found to measure 45 cm. in length, 19 cm. in breadth at the middle, and 21 cm. in breadth in the pyloric region. Its capacity, measured with water, was about eight pints. A semicircular ulcer, 4.5 cm. in length, 2 cm. in breadth, and situated close to the pylorus, had puckered the mucous membrane in such a manner that several folds appeared completely to close the orifice. Nothing in the patient's history indicated that she had ever been the subject of gastric ulcer, although she was of course closely questioned with special reference to this point. It was thought that the stomach pump was of use in this case by relieving the sense of distension, which was a distressing symptom.

In the second case the patient was a young woman of intemperate habits, who, after presenting the symptoms of a slight attack of jaundice for a few weeks, began to vomit blood, as much as a large bowlful of black clotted blood being thrown up at one time. This symptom was succeeded by more intense jaundice, chills, pain in the abdomen, principally in the epigastric region, bloody stools, thirst, and fever. Upon examination the liver was found to extend down to the anterior iliac spine, and to be tender upon pressure. The urine contained albumen. The autopsy confirmed the diagnosis which had been made during life. In cirrhosis with enlargement the symptoms differ, Dr. Ross says, from those observed in the more ordinary form of the disease. The former pursues a more rapid course, and is more usually accompanied by jaundice than the latter. On the other hand, it is rarely complicated by ascites.

The third case is one of great interest. Its principal points are as follows: A lad aged 20 years, who had always been lame in his right leg, and weak in his right arm, both of which were smaller than their fellows, received, through the accidental explosion of a revolver, a bullet wound in the sixth interspace of the left side, beyond the nipple, which was followed by empyema. This was successfully treated by a free incision and subsequently by disinfecting injections. Ten days after the accident, however, while he was suffering a good deal from his side, his right arm and leg were suddenly seized with active continuous spasmodic movements. These movements continued for some time, and were so violent that his friends became alarmed and endeavoured to restrain the limbs by fastening them with bands to the bed. He never lost consciousness, and never had a convulsion. This condition of clonic spasm gradually wore off, and was succeeded by peculiar motions of the fingers and toes, which we will let Dr. Ross describe in his own words: "The spontaneous movements, when watched," he says, "appear to consist of a series of muscular contractions, beginning in the extensors of the phalanges and passing thence up the arm, along the muscles of the anterior region, flexing the wrist and forearm, and rotating the hand from within outwards. At the same time there is a movement of abduction in the phalanges, all the other fingers being drawn away from the middle finger. The muscles of the arm and forearm can be felt to contract, especially the biceps; the muscles of the shoulder and the pectoralis major also participate." He had very little voluntary control over the muscles moving the fingers and hand. Involuntary spasmodic contractions were observed to occur at short intervals in nearly all the muscles of the right lower extremity, but were not so strong or so marked as in the arm. Sensation was unaffected.

These nervous symptoms seemed to be unaffected by remedies, and were present when the patient was discharged from the hospital. Rather curiously the movements ceased while the patient was under the influence of ether, which was given to him for the performance of the operation above alluded to, and did not return when he regained consciousness, but gradually reappeared at the end of a week.

If our memory serves us, in the condition described by Dr. Hammond, the involuntary movements are confined to the fingers. In this case it will be noticed there were spasmodic contractions of the muscles of the arm and thigh. It would seem, therefore, more proper to regard it as an example of post-paralytic chorea—a condition which has been recently described in this Journal by Dr. Weir Mitchell and others.

The case of poliomyelitis presented some unusual symptoms, viz., convulsions, hyperæsthesia, pain, and increase in the reflex movements. Its general features were, however, certainly those of the disease described by Althaus under that name, and the author explains the unusual symptoms by supposing that other parts of the gray matter of the cord than the anterior cornua had become involved in the morbid process.

Dr. GEORGE WILKINS is the author of two papers. In the first he reports a *Case of Spinal Apoplexy*, the subject of which was a married man, 40 years old, who for about a week before the occurrence of the hemorrhage had suffered from some vague symptoms of disease of the cord, such as flushes of heat, chills, slight pains in the limbs, and a feeling of not being quite so well able to work as usual. On the day previous to his admission to the hospital he took four or five glasses of spirits and lay down on the floor of the room, where he fell asleep. On awakening and attempting to rise, after lying there five or six hours, he found he was completely paralyzed. When first seen by Dr. Wilkins, there was complete loss of power and sensation in the body and limbs below the line of the nipples; also loss of muscular power in the arms, except in the flexors of the arms, and loss of sensation except over the radial side of forearm, in which region, although able to recognize a piece of money, he cannot differentiate heat and cold. There was also complete absence of reflex excitability in the paralyzed parts, and almost complete absence of faradic irritability on applying a current to the legs. His temperature on admission was 103.2°. It rose on the following morning to 104.3°, falling the same night to 99.2°, and the next morning to 96°, at which it remained, with a variation of 0.2° on one day, up to the time of his death. This occurred on the tenth day, and was due to asphyxia, caused by an accumulation of mucus in the bronchial tubes, which he had not the power to expectorate.

At the post-mortem examination a clot was found in the spinal cord extending downwards from the point of origin of the second cervical nerve to that of the fourth dorsal. That portion of it between the fifth and eighth cervical nerves was somewhat cone-shaped, the larger extremity of the cone being opposite the origin of the fifth cervical nerve, where it was twelve by five millimetres in diameter, dwindling down to about two millimetres in diameter, opposite the eighth cervical nerve, below which it was continued as a mere trace to the lower limit first mentioned; opposite the lower fibres of origin of the fifth cervical it became suddenly smaller, after which it gradually diminished in size to the upper limit first mentioned. The clot occupied the centre of the cord, and where small enough appeared to the naked eye to be limited to the gray matter.

On microscopical examination the cord was found to be more vascular than normal, many of its vessels had aneurismal dilatations, and several of the sections showed capillary extravasations. Other changes of an inflammatory nature were also found and served to explain the nervous symptoms which preceded the graver ones due to the apoplexy.

The second communication from Dr. Wilkins is a full description, accompanied by two plates, of *a new kymograph*, an apparatus which is intended to facilitate the demonstration of physiological experiments to a class of students.

Dr. WILLIAM OSLER contributes two pathological papers to the volume. The first of these is entitled *Cases of Cardiac Abnormalities*, and contains the records of four autopsies with remarks. The first case reported is one of general dropsy of the fœtus depending, in the author's opinion, upon premature closure of a foramen ovale. He admits, however, that general dropsy has existed in fœtuses in which the foramen ovale has been found perfectly healthy. Indeed, in some of the reported cases the heart is said to have been entirely healthy.

The interest in the second case attaches to the fact that the subject of it lived for four months, although an extreme degree of stenosis of the pulmonary orifice was present, and was unaccompanied by imperfection of the ventricular septum or patency of the foramen ovale, a condition in which

Rokitansky has never known life to be prolonged for more than three months. In the third case there were atresia of the pulmonary orifice, hypertrophy of the left ventricle, imperfection of the septum ventriculorum and patent ductus arteriosus. In the fourth case the descending aorta with the left subclavian artery was given off from the right ventricle while the innominate and left carotid arteries came off from the left ventricle.

Dr. Osler's second paper is *On the Condition of Fusion of Two Segments of the Semilunar Valves.* In it he reports seven cases in all of this curious condition, which he is inclined to attribute to primary malformation rather than to the effects of inflammation.

The patient in Dr. JOHN REDDY'S *Case of Rupture of Mitral Valve* had been for some time a sufferer from disease of the heart. While engaged in dumping his cart after a day of unusually hard work, he was suddenly attacked with pain in his left side and "felt that he could not work much longer." He, however, continued to work until evening, and although he suffered severely the next day from cough and dyspnœa did not apply for admission to the hospital until four days after the accident. On admission, a double murmur was heard all over the chest, but loudest at the base of the heart. The systolic murmur was so loud and harsh that the diastolic seemed feeble by contrast, and the breath sounds were obscured by it. At the autopsy, the aortic segment of the mitral valve was found floating loosely in the cavity of the ventricle, its chordæ tendineæ having been ruptured.

Dr. T. G. RODDICK communicates the history of a *Remarkable Case of Favus* in which the eruption besides covering almost the entire scalp was well marked and extensive on the back of the neck, along the spine of the scapula, and on the outer side of the arm as far as the junction of the upper with the middle third of the forearm, being especially thick over the point of the olecranon. The sides of the body and buttocks were thickly covered, and the crusts here were remarkably well-defined, being rounded, and in places standing isolated from one another. The patches on the limbs were also most characteristic, and were confined almost exclusively to the extensor surface. The patient was a girl ten years old, several of whose family had suffered from the same disease. Recovery eventually took place under the use of the usual remedies, viz. epilation and the sulphurous acid lotion. The paper is accompanied by a plate showing the distribution of the crusts and the extent of the eruption on the body.

The *Pathological Report*, by Dr. WILLIAM OSLER, comprises the reports of 42 post-mortem examinations, which have been selected on account of their interest from the 225 autopsies made at the hospital between October, 1877, and October, 1879. It includes several very unusual cases, as for instance nine cases of aneurism, there being no less than four cases of intracranial aneurism among them, and it has evidently been prepared with great care.

The last paper in the volume is a *Statistical Review of Cases of Typhoid Fever, Pneumonia, and Acute Rheumatism treated in the Hospital during the Ten Years ending May* 1, 1879, *with Remarks thereon*, by Dr. JAMES BELL, House Surgeon. From this we learn that during this period there were treated at the hospital 660 cases of typhoid fever, with a mortality of 10.45 per cent.; 353 cases of pneumonia, with a mortality of 25.8 per cent.; and 456 cases of acute rheumatism, with a mortality of 1.75 per cent. The mortality of all these diseases, however, varied at different seasons and in different years. This paper is provided with six tables, the first three of which are arranged to show the number of cases of each disease treated and their termination in each month. The last three are arranged to show the influence of sex and age, and they also give the yearly mortality percentum. J. H. H.

The surgical papers in this volume will require but short notice, since they number only seven, and are mostly made up of records of isolated cases. Two of them are on ophthalmic subjects, one, comprising a list of anomalies found in the dissecting room of McGill University, is written by an out-door surgeon, and the four remaining papers are the work of Dr. T. G. Roddick. It will thus be seen that the wards of the hospital have furnished but little on general surgery, and this has all been contributed by one attending surgeon. The other members of the staff must be considered mere figure heads as far as literary contributions from the hospital are concerned.

The article on *Anatomical Abnormalities*, by FRANCIS J. SHEPHERD, M.D., is of much interest, and is illustrated by a number of excellent lithographs. Some of the anomalies mentioned are rare, though Dr. Shepherd has evidently not failed to record the anomalies that occur frequently. It is important to note that in twenty-eight cases where the obturator artery arose from the epigastric, in only two did it pass along the inside of the femoral ring.

In the report of *Fifteen Cases of Tumour of the Breast*, Dr. RODDICK claims that the good results after excision were due to the antiseptic method. He makes further reference to this method of treatment in *Remarks on Lister's Antiseptic Method as practised in the Hospital;* in which paper he gives a table showing the death rate to be 3.12 per cent., and states that previously the occurrence of erysipelas and blood poisoning after operations were very frequent.

In an article entitled *Surgical Records* a number of clinical cases are detailed by the same gentleman. An instance of caries of the atlas and axis, with retro-pharyngeal abscess, is mentioned, in which recurring paralysis took place on motion of the patient. This was shown by the autopsy to be due to displacement of the odontoid process, which had lost its ligamentous attachments. A successful case of excision of the lower end of the rectum, and an instance of traumatic tetanus which recovered under the use of chloral, are recorded.

In a fourth paper he furnishes an account of a child suffering with *occipital meningocele*, which he treated by a seton on account of the urgent solicitation of the parents. Death, however, occurred in two weeks.

The two ophthalmic papers are by Dr. FRANK BULLER, and are entitled, *On the Use of Eserine in Ophthalmic Practice*, and *Miscellaneous Ophthalmic Cases*. He has seen some benefit from eserine in certain cases of glaucoma, but says that in corneal ulcer he has observed circumorbital pain and synechiæ occur. An interesting case of syphilitic condyloma of the eyelid, with bubonic enlargement of the lymphatic glands over the parotid, is worthy of the attention of those interested in ophthalmology.

J. B. R.

ART. XXIV.—*The Essentials of Anatomy, designed as a Text-book for Students, and as a book of easy reference for the Practitioner.* By WILLIAM DARLING, M.D., F.R.C.S., Prof. of Anatomy in New York University, and A. L. RANNEY, M.D., Adjunct Prof. of Anatomy in New York University. 8vo. pp. xvi., 629. New York: G. P. Putnam's Sons, 1880.

THE title of this book exactly represents its purpose. It is not a treatise on anatomy, nor is it a descriptive, topographical, or surgical anatomy. Accordingly it has no accurate and full descriptive text, and no illustrations (though it has a few diagrams); but it is a grouping of the prominent and *essential* facts of anatomy briefly and clearly stated. To use it alone, without either such a book as Quain or Gray or Henle, and a manual of dissections like Heath's, would be a grave error, but with them it will prove an exceedingly valuable book. Its chief merits, in fact its distinguishing features, are its mechanical arrangement, and particularly its numerous and systematic tabulations which recur on almost every other page. The value of these in assisting us to recall our anatomy, every one will readily recognize. Especially is this true of those relating to the arteries and nerves.

For the very reason that the book is good, we point out a few minor errors that should be corrected in any subsequent edition. Thus on page 7, the bones of the leg are stated as the patella, tibia, and fibula, but are added up as only two; and on the same page it is stated that the sesamoid bones are excluded from the enumeration, yet the patella has just been included.

In the table opposite page 76, the *foramen lacerum orbitale* should be "*anterius*" to correspond both with custom and the foramina "*medium*" and "*posterius*" of the same table. On page 92 the minor centres of ossification are called "complimentary" instead of complementary. The Y ligament of the hip should be designated as the inverted Y ligament on pages 187–9. More serious errors are the non-recognition of the proper muscular actions of the supinator longus as a flexor, its chief function, and of the interossei in flexing the first and extending the last two phalanges. Again the whole length of the urethra is stated at 8½ inches of which 1¼ are prostatic and 6 spongy. The length of the membranous portion is not given, but must be erroneously inferred as 1¼ inches. On page 296 the height is stated as equal to the distance between the tips of the middle fingers when the arms are extended horizontally. From say three to five years of age this is true, but at birth the male height exceeds the finger tip measure in the proportion of 1000 to 987, while in the male adult it falls considerably below it in the proportion of 1000 to 1046. At both ages the measurements are much more nearly identical in the female (1000 : 993 and 1000 : 1016). W. W. K.

ART. XXV.—*The Influence of School Life upon the Eyesight, with Special Reference to the Public Schools of Dayton.* By W. J. CONKLIN, M.D., Prof. of Diseases of Children in Starling Medical College, Dayton, Ohio, 1880. Pamphlet, pp. 32. Dayton, 1880.

THIS little pamphlet of 32 pages is a very praiseworthy effort towards practically applying the facts and suggestions which we owe to Cohn, Liebreich, and their followers, and which were presented to the readers of this Journal in an article on the Hygiene of Sight, in July of last year (p. 220). Prof. Conklin's essay was adopted by the special committee appointed to consider the subject, and was submitted to the Board of Education March 12, 1880, and printed by order of the Board. Being intended especially for the non-medical public, Dr. Conklin judiciously prefaces his observations with a short description of the usual forms of divergence from normal vision met with in scholars, and then furnishes in tabular form the results of his investigations into the condition of the pupils in the Dayton schools. The tables show that out of 333 pupils in the District (or Primary) Schools, 48, or 15.35 per cent., were myopic; out of 153 in the Intermediate Schools, 27, or 17.65 per cent.; and out of 279 in the High School, 18.32 per cent. were affected with myopia. Dr. Conklin appears to have made an error in his calculation of the percentage of myopes in the District Schools, which should be given at 14.41, instead of 15.35, a number so unusually large that he attempts on page 10 to explain away some of its exaggerated magnitude. Very truly and very much to the point does he remark on the next page, "Statistics are often like a two-edged sword, the unskilful wielding of which may injure friends as well as foes, but there does not seem to be any escape from the conclusion: First, that the percentage of short-sightedness increases as a rule proportionately with the advancement in the school grades. Second, that Dayton schools offer no exception to the rule."

The author then proceeds to review in detail the heating, ventilating, and mode of illuminating of the various school-houses, pointing out in accordance with sound and correct principles the errors and deficiencies with which the educational edifices of Dayton, like too many at home and elsewhere abroad, are afflicted. In regard to school furniture, Prof. Conklin arrives at almost the identical conclusions reached by Liebreich, in his lectures already referred to. Some excellent rules respecting the use of the eyes, ordered to be printed in large type and placed in every school room, are appended to the report. J. G. R.

ART. XXVI.—*Narrowing, Occlusion, and Dilatation of Lymph Channels; acquired forms.* By SAMUEL C. BUSEY, M.D. Reprinted from N. O. Med. and Surg. Jour., 1876–1878. 8vo. pp. 195.

THIS work and one previously reviewed (see this Journal for October, 1878, p. 527) are complementary to each other, the one dealing with congenital, the other with acquired forms of the same diseases. Like the former volume, this consists largely of cases (67 in number), which are given in a *résumé* or in full according to their importance, and discussed with all the fairness and also the faults to which we previously called attention. But for any one who wishes to study the subject, we do not know any compendium of facts and cases at all to be compared with these two volumes, and they represent an amount of labour and research that few can understand who have not done similar work. The account of the anatomy of the lymphatic system is very good, yet we must confess to some surprise at seeing Gray quoted in the bibliography, while Sappey and Cruveilhier are omitted. The fact of its being a republication from time to time from a medical journal, is responsible, we presume, for its poor typographical appearance, but that cannot excuse the absence of any index, without which no scientific book should ever be published.

W. W. K.

Art. XXVII.—*Post-Mortem Examinations, with especial Reference to Medico-Legal Practice.* By Professor Rudolph Virchow, of the Berlin Charité Hospital. *Translated from the Second German Edition*, by Dr. T. P. Smith. 8vo. pp. 145. Philadelphia: Presley Blakiston, 1880.

In the publication of a translation of the enlarged reprint of Virchow's contributions to the first volume of the "New Annals of the Charité Hospital," an exceedingly practical and handy work is offered to a large circle of readers.

We are informed in precise and exact terms how a post-mortem examination should be made, both with regard to the plan to be pursued, and the manner of making the several cuts into the various organs and tissues. The method of recording the results of the investigation is clearly indicated by the addition of the detailed account of the examination of four cases, and the value of the objective evidence is accurately stated in the form of the inferences which are drawn concerning the manner and cause of death.

The addition of the Regulations of the Prussian Government for the guidance of its medical officers is of especial value to those who may be employed to make autopsies for medico-legal purposes. It is earnestly to be desired that a copy of these regulations should be in the hands of every coroner and medical examiner in the country, and that his report to the grand jury or magistrate should be based upon the plan here presented. The opinions of medical experts would carry far greater weight and be much less liable to rebuttal if the data thus collected were placed before them in so accurate and unprejudiced a manner as the close following of these regulations would necessitate. R. H. F.

Art. XXVIII.—*Transactions of State Medical Societies.*

1. *Proceedings of the Louisiana State Medical Association at its Second Meeting, held in the City of New Orleans, April* 9, 10, and 11, 1879. 8vo. pp. 206. New Orleans, 1879.
2. *Transactions of the Thirty-fourth Annual Meeting of the Ohio State Medical Society, held at Dayton, June* 3, 4, and 5, 1879. 8vo. pp. 218. Columbus, 1879.
3. *Transactions of the Indiana State Medical Society*, 1879. *Twenty-ninth Annual Session.* 8vo. pp. 252. Indianapolis, 1879.
4. *Transactions of the Twenty-ninth Annual Meeting of the Illinois State Medical Society, held at Lincoln, May* 20 and 21, 1879. 8vo. pp. 302. Chicago, 1879.

1. This volume of the *Louisiana Proceedings* contains two principal articles: Dr. Chaillé contributes an address on State Medicine and Medical

Organization, which briefly considers some of the more urgent questions usually discussed under the different branches of the subject. State medicine, he defines as "the application by the State of medical knowledge to the common weal, and embraces every subject for the comprehension of which medical knowledge, and for the execution of which the legislative and executive authority of the government, are indispensable."

Dr. Joseph Jones, in an article of one hundred and twelve pages, has furnished an exhaustive review of the "Comparative Pathology of Malarial and Yellow Fevers," which is largely historical and descriptive, but concludes with a summary of the clinical features of these two diseases arranged in parallel columns in order to bring out the contrast for diagnostic purposes. A critical study of yellow fever, *upon the spot*, by Prof. Jones, leads him to draw the following practical conclusions :—

> "1st. The increase in the number and extent of the epidemics of yellow fever in New Orleans has been intimately associated with the accumulation of unacclimated human beings in the city, and with the increase of commerce and the consequent crowding and the accumulation of filth and crowd-poison in ships, and in badly constructed, and badly drained and policed habitations.
>
> "2d. By its geographical position, by its peculiar topography, situated upon a low, alluvial, badly drained, swampy plain, surrounded by large bodies of water; by the exposure of an extended river bank, putrid, stagnant canals and marshes; by defective drainage, sewage, and police; and by its hot and moist climate, New Orleans has been peculiarly exposed to the ravages of yellow fever.
>
> "3d. No such marked differences exist between the climate of New Orleans and that of Havana and Vera Cruz as would warrant the assertion that yellow fever is always endemic in the latter two cities and that at the same time it cannot originate *de novo* in the former. Whilst it is the wish of every true patriot to claim all excellences of position and health for the land of his choice and love, at the same time the future advancement of sanitary science and the highest interest of humanity demand that all causes of disease, whether existing in the soil or climate, should be honestly stated and fully weighed. In sanitary science, as well as in disease, and the science of medicine, the proper remedies and preventives can only be fully appreciated by a comprehension of all the dangers and difficulties.
>
> "4th. Those who hold to the view that yellow fever never originates in New Orleans, but is *always imported*, must at least be forced, by the past history of the great epidemics of this city, to admit that its climate and situation are such as to admit of the easy lodgment and rapid propagation of the seeds of this disease.
>
> "5th. Every system which would look exclusively to the defence of New Orleans from pestilence by quarantine is vicious, and destructive at once to commerce and the best interest of the city, in that it leads to the neglect of those sanitary measures which will best promote the removal and eradication of the causes of disease, and the removal of those physical conditions which promote the rapid spread of destructive epidemics.
>
> "6th. It may be possible to institute at once a just and enlightened system of quarantine and hygienic rules among the agents and in the vehicles of commerce, and an enlarged and progressive system of sanitation, embracing thorough drainage, abundant water supply, rapid and efficient removal of all excrementitious matter, and the proper elevation and construction of well-ventilated and thoroughly policed houses."

The President's annual address was presented this year by the senior Vice-president, Dr. Bemiss, who also refers to the important subject of yellow fever and its prevention by sanitary measures and quarantine; and speaks in high terms of the National Board of Health and of the importance of the labour in which it is engaged.

Among the short papers in this volume is one by L. F. Salomon, M.D., presented as a report on the Existence of Leprosy in Louisiana. Notes of fourteen cases were communicated, six of which were in New Orleans. The writer recommended the isolation of lepers, as the disease may spread in three ways: by heredity, inoculation, and possibly by too free communication of the healthy with the sick. A more complete report upon this very important subject was promised for the next meeting.

A very interesting case of amputation of a toe of a coloured man while under the influence of mesmerism (artificial hypnotism of Carpenter) was contributed by Dr. E. S. Day, of Hempstead, Texas.

Dr. M. Schuppert, in discussing "The Cure of Oblique Fracture of the Thigh Bone without Shortening of the Limb," repeats the old claim, that has been repeatedly proved to be erroneous, that the application of the plaster of Paris bandage will prevent any shortening after the oblique fracture.

2. The retiring President of the *Ohio State Medical Society*, Dr. B. B. Leonard, selected as the theme for his address one of the great questions of the day, "State Government and Medical Organization," which forms an admirable supplement to Dr. Chaillé's address, before referred to, and which similarly urges a higher appreciation of the services of the skilled physician to society, and skilfully suggests some of the steps to a higher position.

Prof. Roberts Bartholow, now of Philadelphia, contributed a very practical and valuable paper "On the Treatment of the various Forms of Consumption" in which a routine treatment is strongly condemned, for which he would substitute one adapted to the form of the disease; caseous pneumonia, chronic tuberculosis with localization in the pulmonary parenchyma, and so-called fibroid phthisis, forming the three principal varieties.

A climate possessing purity, dryness, and elevation, and uniform as to moisture and temperature, is the best for consumptives, while the proper care must be paid to their hygiene and nutrition. The condition of the digestive organs should be considered of primary importance, and gastric catarrh be relieved by appropriate means; at the head of the remedies for this condition he would place arsenic, and next to it silver, either as oxide or nitrate. Pepsin and cod-liver oil can be taken with advantage; if there be vomiting, strychnia is very efficient. Alcohol, after meals, is often of service, the usual amount being about half an ounce. In caseous pneumonia, the salts of ammonia increase the alkalinity of the blood, prevent the coagulation of fibrine, and possess a solvent power over exudations. Preferably, the carbonate is exhibited, dissolved in the solution of the acetate, and if the iodide be given conjointly, they should be made into an emulsion.

Rest, in the treatment of phthisis, is of paramount importance, when fever is present. For the relief of cough with profuse expectoration, carbolic acid may be given; but when the cough is severe, with reflex vomiting and night-sweats, the author orders a combination of codeia, or morphia sulphate, atropia sulphate, and strychnia sulphate. The atropia is of marked efficacy in consumption, and may be taken in small doses for years without disadvantage, according to Dr. Bartholow.

The "Preservation of Good Eye Sight, and the Use of Spectacles," by J. H. Buckner, M.D., contains practical information upon eye troubles, especially the causes of the prevailing errors of refraction, that every physician should be acquainted with. The London smoke glasses are better suited to weak or sore eyes than either green or blue, since they do not change the light, but simply soften all the rays.

A report from the Special Committee on the Progress of Surgery, by S. F. Forbes, embodied short references to some of the principal improvements suggested during the preceding year. Dr. D. N. Kinsman also presented a very instructive report on Hog Cholera.

Dr. J. C. Reeve, of Dayton, read a paper, urging the practice of Mixed Anæsthesia, *i. e.*, preceding by a small dose of morphia the administration of the anæsthetic, which he believed lessened the danger of the inhalation.

A short article by Dr. P. S. Conner, recommends the use of the plaster of Paris roller in the treatment of club-foot, on account of its cheapness, comfort, and efficiency.

In an article upon Sanitary Laws, Dr. Geo. E. Walton presents a very timely and suggestive essay upon the important question of How Far a Government should Interfere with Private Right for Public Benefit. In its application to medical practice he considers that, in the words of Baron Humboldt, " it is not only advisable, but necessary, that the State should examine into the qualifications of those who destine themselves for such pursuits, provided they agree to submit themselves to its tests, and furnishing them with testimonials of fitness, in case of a favourable issue of the inquiry, to acquaint the citizens they can only confide with certainty in those who have thus been proved."

Short papers upon Glaucoma, by Dr. S. C. Ayres, referring particularly to temporary dimness of vision and headaches, the immobility of the pupil and episcleral injection, that indicate to the watchful observer the first insidious approach of this unfortunate malady; and calling attention to the use of duboisia and iridectomy in the treatment, has considerable practical interest. The Metric System is the subject of a communication by J. F. Baldwin, M.D., and after a calm and critical consideration of the question, in which its objections are fairly stated (and after two years' personal experience in its use), he concludes that "the metric system possesses no advantage over our old method of writing prescriptions (save the scarcely tangible one of uniformity with Europe), while it does possess several manifest and even obtrusive disadvantages."

The papers contained in this volume are short and practical, brief, and to the point. Other State societies would do well to adopt the same rule, limiting the length of addresses and essays.

3. The *Indiana State Medical Society's Report* is in a neat octavo volume bound in cloth, and contains, what the preceding two lack, a table of contents. Eleven practical and generally brief papers are presented, besides the minutes, etc. The President's annual address, delivered by Ben. Newland, M.D., is upon almost the identical topic of the two volumes we have just noticed. "The Relations of Legislation to Sanitary Protection." In pointing out some of the needs of the people, the position of the physician in the community is defined, and the right of the people to be protected from ignorant and criminal practitioners of medicine, and particularly the advertising charlatan, is insisted upon. The following very pertinent reference and proper recommendation is made in regard to proprietary medicines.

> "The last legislature saw fit to make rules in regard to a statement of the ingredients of fertilizers being labelled on every barrel of the article sold within

the limits of the State. It also prescribed by statute the test to which coal oils should be subjected before they should be permitted to be sold. Would it be asking too much, that these provisions should be extended by law to all patent medicines sold to the people, in order that they might be able to know what ingredients they were to consume in these so-called medicines, and also might be protected from extortion, and not forced to pay a dollar or more for a little water, molasses, essence of wintergreen, and tincture of wild-cherry bark, and done up with a fancy label bearing the captivating text, 'Dr. Cureall's infallible, sure cure for consumption and all kindred complaints, including scrofula and diseases of the kidneys.' "

The address closes with a strong appeal for the establishment of a State board of health, and the passage of a law for the regulation of medical practice.

In a paper entitled the "Rational Treatment of Dysentery," Dr. George L. Andrew advocates the view of the specific nature of the disease, and its treatment by ipecacuanha and salicylate of sodium. Ergot, on theoretical grounds, is also recommended.

Dr. Enoch W. King presents statistics of placenta prævia, and by direction of the Society continued his observations to report at the succeeding meeting. Dr. E. S. Elder advocates Crede's method of delivering the placenta, and prefers deferring the ligature until after placental delivery.

"Excision of the Knee-joint, with Cases," is the title of a communication from Dr. Joseph Eastman, in which amputation for chronic synovitis is condemned, and excision of the joint recommended in preference. Dr. R. E. Haughton contributes a report of "A Case of Fracture of the Cervical Spine" (fatal), and urges operative interference in cases of fracture of the vertebræ, with pressure on the cord.

4. In the annual address of the President of the *Illinois Society* Dr. E. P. Cook gives due attention to sanitary legislation and the regulation of medical practice. The working of the new board of health and the enforcement of the Medical Practice Act, of which the board were executive officers, have been very salutary, and have "accomplished more in the direction of medical education in our State [Illinois] than could have been done by any other means in the same or much longer time."

The "Sanitation of Small Cities" is the subject of a short, practical article from the pen of Dr. David Prince, in which the problems of the proper disposal of drainage and sewerage and the correction of unhygienic conditions of the soil are especially considered; the former have much to do with the so-called zymotic diseases, the latter more particularly with malarial disorders and consumption.

The treatment of fractures, more particularly of the femur, received considerable attention at this meeting. After presentation of the report on progress in surgery by the committee, Dr. Truesdale read a paper advocating the triple inclined planes for the treatment of fractured femur; and Dr. H. Z. Gill presented a supplemental report to that of the committee, in which early reduction and correct apposition of the fragments, with retentive apparatus and extension are advocated, while some shortening may be expected from any method of management. Dr. Gill also contributes a practical paper on the Surgical Treatment of Croup, insisting upon the value of early tracheotomy and prescribing the method of performing it, with reports of successful cases.

In the Report on Obstetrics Dr. C. C. Hunt recommends hot-water injections in uterine hemorrhage, briefly considers the conditions of delayed labour, three instances of which are given, and reports a case of ante-partum hour-glass contraction (tetanoid falciform constriction of the uterus, or organic stricture, probably the latter). Craniotomy and version were performed and extraction accomplished—the mother died on the fourth day. The condition here referred to and the result are very similar to those reported by Drs. Alfred Hosmer, E. R. Stone, C. A. Thompson, and others. The recommendation of Dr. Hosmer to perform Cæsarean section would seem, in the light of experience, to offer the best chance of recovery for the mother and the only one for the child ; in default of an operation, several cases have perished undelivered.

"The Chiropodists" is the title of a paper by Prof. Edmund Andrews, in which much information is given of a specialty which bids fair to become "as legitimate and well defined as dentistry." The operation for the relief of ingrowing nails, performed by one of these artists, bids fair to become a permanent procedure. "Commencing on the side of the toe, a little outward from the border of the nail, he cuts out a narrow, elliptical, or rather lanceolate strip of flesh, leaving intact the natural border or fold of skin. By bringing the edges of the incision together with sutures, he draws the overlapping flesh away from the nail, and effects a permanent cure with the least possible injury to the natural relations of the parts."

It is unfortunate that the text of this otherwise excellent volume of reports is marred by careless proof-reading, as numerous errors are observed, which are not included even in the *corrigenda*. F. W.

ART. XXIX.—*A System of Medicine.* Edited by J. RUSSELL REYNOLDS, M.D., F.R.S., Professor of the Principles and Practice of Medicine in University College, London, etc. *With numerous additions and illustrations.* By HENRY HARTSHORNE, A.M., M.D., lately Professor of Hygiene in the University of Pennsylvania, etc. In three volumes. Vol. III., *Diseases of the Digestive, Blood-Glandular, Urinary, Reproductive, and Cutaneous Systems.* 8vo. pp. 990. Philadelphia: Henry C. Lea's Son & Co., 1880.

THE principal additions made by Dr. Hartshorne to the third volume of the American edition of Reynolds's "System of Medicine" are articles on Cholera Morbus, Cholera Infantum, Pernicious Anæmia, Spermatorrhœa, and Trichina Spiralis. But everywhere throughout the volume, as in its predecessors, will be found, in the shape of numerous notes, evidences of the care with which he has prepared it for publication. These supply omissions in the text or record of facts which have come to light since the original publication of the work. In the articles on Ulceration of the Bowel and Dysentery he has also introduced several wood-cuts taken from the second medical volume of the "Medical and Surgical History of the War," which was fully reviewed in the number of this Journal for last January.

Dr. Hartshorne regards cholera infantum as essentially an entero-colitis. He admits, however, that in addition to this morbid condition there are changes in the blood and evidences of derangement of the ganglionic nervous system—a view of the pathology of the disease which was specially insisted upon by Sedgwick and adopted by Meigs and Pepper. We are glad to find him urging the use of cold baths and of minute doses of calomel in the treatment of this disease. It is not at present necessary to say much in advocacy of the former method of treatment, but it will perhaps not be out of place to state that our own experience fully confirms Dr. Hartshorne's statement as to the value of calomel in the early stages of cholera infantum. Commencing practice about the time that Bennett's writings had produced a distrust of this remedy in the minds of the profession, we naturally fell into the popular error of regarding it as worse than useless. A little later, when we had opportunities for observing its effects for ourselves at the largest dispensary for children's diseases in Philadelphia, we were forced to the conclusion that no other medicine controlled the vomiting of this disease so effectually as it does. We agree with him, also, in condemning the employment of purgatives in this disease, but are disposed to make an exception in favour of the saline cathartics, which we have known to be of service.

In concluding this notice it gives us pleasure to recommend most cordially this "System of Medicine," not merely to the student, but also to the busy practitioner of medicine. J. H. H.

Art. XXX.—*The Principles and Practice of Gynæcology.* By Thomas Addis Emmet, M.D., Surgeon to the Woman's Hospital of the State of New York, etc. Second edition, thoroughly revised. 8vo. pp. 875. Philadelphia: Henry C. Lea, 1880.

The appearance of a second edition of this work in so short a period justifies the high estimate we placed upon its merits, and must be peculiarly flattering to the author. In a very brief preface he states that he has taken advantage of the opportunity to make a thorough revision, which has extended to every page, and several parts have been re-written, and some new matter added. There are evidences of this throughout the volume, both as to text and illustrations. Doctrines have not changed, nor could those do so which are based upon clinical observation, but some statements have been modified and placed in different language. Some portions of the previous edition were written in a tone which seemed hostile to the profession at large, and apparently indicated a feeling towards it which we were confident the author did not cherish. The suggestion was hazarded that this arose from opposition to, or criticism of, some peculiar views and some new doctrines taught by him which varied from those heretofore accepted. Whether correct or not, the time which has now elapsed since the first edition appeared has been ample for these views to be challenged and refuted if not correct. This has not been done to our knowledge, and the fact that it has not must be satisfactory to the author. Take the subject of laceration of the cervix: during the year which has now elapsed since the appearance of the first edition, we believe the current of professional opinion has set strongly in favour of the great value of Dr. Emmet's discovery as to the pathological importance of this lesion, and as to the efficacy of the operation for its cure. The recognition of his services in advancing practical knowledge and increasing the power to relieve and cure, is more manifest every day. When substantial benefits have been conferred it would be captious to attach any great importance to the language used by a man thoroughly in earnest in presenting his views.

The short time which has elapsed since the former notice relieves us of the necessity of going into any detailed examination of the work. The closing pages of this edition are, however, worthy a moment's attention as showing the splendid results of the antiseptic method of performing ovariotomy and its influence upon practice. Dr. Keith has operated sixty-six times without a death, and Spencer Wells has had but six deaths out of eighty-one cases since he has adopted the antiseptic method! The effect of this upon practice has been revolutionary.

> "Experience has already demonstrated that, with the antiseptic method, we are justified now in undertaking the removal of ovarian tumours at a much earlier stage of their growth. In the greater number of cases from a year to eighteen months can be gained; and many advantages can be claimed in favour of the operation as soon as the tumour rises out of the pelvis. . . . With these advantages in connection with the antiseptic method, the rule, as to the best period in the growth of the tumour, for its removal, has been reversed, and, as Dr. Keith has stated, ovariotomy is not the operation it was even two years ago."

A striking instance of the rapid advance we are making even in a field which, it would seem, could present no opportunity for anything more brilliant than had already been achieved.

As "spaying," or "Battey's operation," is still on trial before the profession, it may be noted that the author adds one more indication for its performance to those of the former edition: to "threatened insanity, epilepsy, or phthisis," he appends "the arrest of hemorrhage from a fibrous tumour."

The favourable reception accorded to this work abroad must be an additional gratification to the author, as it must be considered the highest testimony to its merits. When a book crosses the seas it passes beyond the range of the partiality of friendship, and of any adverse influence of personal feeling which may exist. The high encomiums generally bestowed by the British and European journals bear witness to the fact that Dr. Emmet's work is a valuable and worthy addition to American medical literature.

J. C. R.

ART. XXXI.—*The Microscope in Medicine.* By LIONEL S. BEALE, M.B., F.R.S., Professor of the Principles and Practice of Medicine in King's College, London, etc. Fourth edition, much enlarged. 8vo. pp. 530. Philadelphia: Lindsay & Blakiston, 1878.

THE encyclopediac character of this last edition of Dr. Beale's well-known work, "The Microscope in Medicine," renders it impossible to present even an abstract of its contents. Suffice it to say that anything in his department upon which the physician can desire such information as is furnished by the microscope will be found here, and much more, in addition. When the topics treated of are so numerous it is difficult to adopt a systematic arrangement, but we have sometimes thought that the work might be improved in this respect. The present much enlarged volume retains the original method, but with the assistance of the very copious index, both of contents and illustrations, it is comparatively easy to find what one wants.

Dr. Beale retains his original views with regard to cell life, and of the nature of contagium. He rejects totally the bacterium hypothesis of contagium, and adduces arguments against it. He ascribes contagious diseases to the action of the contagious bioplast, a living particle of matter, in most cases less than $\frac{1}{100000}$th of an inch in diameter, derived from the organism affected by the contagious disease, and capable of exciting the same disease under appropriate circumstances in the organism of another individual. Like the pus-bioplast, it is "originally derived by direct descent from the bioplast of the body of man or animal, and is not of the nature of bacteria or akin to any low form of vegetable organism."

We were also much interested in reading Dr. Beale's section on tubercle. Here again he takes exception to modern doctrines, as to the histology, origin, and nature of tubercle, but it seems to us with much less reason than he objects to the so-called germ theory of disease. It is true that the question of tubercle is at present a very unsettled one, and there is much speculation on the subject, but we do not think that the facts upon which this reasoning is based, are erroneous; in other words, we believe that our knowledge of the histology of tubercle is more precise and accurate than it has ever been, and that it is in the main correct, while that of its histogenesis and exact relation to other inflammatory products is as yet unsettled.

The close personal relation of Dr. Beale to the making of his work, in every particular, not only in authorship, but in the production of the illustrations on wood, close superintendence of the mechanical execution, such as is the natural consequence of immediate ownership, has resulted in the production of a book, which is a type of perfect execution. It is moreover, a storehouse of facts most valuable to the physician, and is indispensable to every one who uses the microscope in his profession. That there are still many who do not use it is much to be regretted, although the number of these is rapidly growing less. J. T.

Art. XXXII.—*A Text-Book of Physiology.* By M. Foster, M.A., M.D., Prælector in Physiology and Fellow of Trinity College, Cambridge. From the third and revised English edition, with Notes and Additions, by Edward T. Reichert, M.D., Demonstrator of Experimental Therapeutics, University of Pennsylvania. With two hundred and fifty-nine illustrations: pp. 1030. Philadelphia: Henry C. Lea's Son & Co., 1880.

That the work upon our table possesses intrinsic merits of a high order is abundantly shown from the warm reception accorded it by the profession on both sides of the Atlantic. It rarely happens that a new book in any department of medicine reaches a fourth edition within three years from the date of its first appearance; this, however, has been the history of Dr. Foster's "Text-Book of Physiology." We speak of the volume before us as a new edition advisedly, for while the author's text is the same as that of the third English edition, which was noticed in the January (1880) number of this Journal, the additions of the American editor are so copious and important as to largely increase the book's sphere of usefulness. In notices of former editions we alluded to the absence of any reference to the physiological anatomy of the various organs, and the dearth of illustrations, as serious drawbacks to the value and general usefulness of Dr. Foster's work. These faults of omission have been intelligently and quite fully supplied by the American editor; and it is just here that we find the distinctive features of the present edition. These additions, inclosed in brackets, and interpolated throughout the text, amount to about one hundred and forty pages, including the illustrations which are increased from seventy-two to two hundred and fifty-nine. An occasional note is also introduced, pointing out the physiological action of a few of the more important drugs. So ably and so thoroughly has the editor performed his task that we have no hesitancy in saying that, in our opinion, the American edition is far superior to its English contemporary as a manual for the student or a book of reference for the practitioner. In its present form we confidently recommend this text-book to the student as a concise, clear, and thoroughly reliable exposition of modern physiology.

W. J. C.

ART. XXXIII.—*Physiological Laboratory, Harvard Medical School, Boston. Collected Papers*, 1873–1879. For private circulation. 8vo. pp. 205.

THIS is the title of a volume which contains the results of investigations in the Physiological Laboratory of the Harvard Medical School, during the past six years under the direction of Prof. H. P. Bowditch. Some of the papers are the following: Experiments on the Action of Bile in Promoting the Absorption of Fats, by Charles H. Williams, M.D.; Intestinal Digestion, by G. M. Garland, M.D.; The Lymph Spaces in Fasciæ, by Dr. H. P. Bowditch; Contribution to the Physiology of the Cortex Cerebri, by James J. Putnam, M.D.; Physiological Action of Thebain, by Isaac Ott, M.D.; Force of Ciliary Motion, by Dr. H. P. Bowditch; Absence of Resonance in the Fifth Right Intercostal Space diagnostic of Pericardial Effusion, by T. M. Rotch, M.D.; The Function of the Epiglottis in Deglutition and Phonation, by G. L. Walton; The Effect of the Respiratory Movements on the Pulmonary Circulation, by Drs. Bowditch and Garland; Growth as a Function of Cells, by Charles Sedgwick Minot; and a description of the apparatus in use in the laboratory by Dr. Bowditch.

Most of the papers have been published in the *Boston Medical and Surgical Journal*, some in the *Journal of Anatomy and Physiology*. The first two were prize essays of the Boylston Medical Society for 1874. All are valuable contributions to anatomy, physiology, and clinical medicine, and show that work of this kind can be done at home as well as abroad, when opportunity is afforded. They reflect great credit alike upon their authors and director, Dr. Bowditch.

J. T.

QUARTERLY SUMMARY

OF THE

IMPROVEMENTS AND DISCOVERIES

IN THE

MEDICAL SCIENCES.

ANATOMY AND PHYSIOLOGY.

The Origin of the Blood-Corpuscles.

Of all the scientific monographs produced during the past year, few can rival in interest a paper by Professor RINDFLEISCH, entitled "Ueber Knochenmark und Blutbildung," and published in a recent number of the *Archiv für Mikroskopische Anatomie.* In this monograph, the red marrow of the cancellous tissue of bone is considered to be the chief source of red blood-corpuscles. We will summarize as follows the arguments by which the author supports this bold theory.

In red marrow are found certain cells, with reddish-yellow homogeneous protoplasm, and distinct nuclei—cells resembling in every respect the nucleated red corpuscles of fœtal blood. The spleen bears similar corpuscular structures, and is recognized as a seat of blood-formation. The red marrow, then, has the same function. In different morbid conditions, the blood has been explored, but without any significant results only in anæmia and leukæmia. Smaller and larger forms of nucleated red corpuscles have been detected under these and other circumstances. But what is the connection between them? This question has particularly occupied the author's attention. First, he explored the vascular relations of red marrow. No structure is so difficult to inject; for the periosteal and Haversian arterioles and capillaries, generally empty after death, are easily injected, but the vessels of the marrow are then full of blood. By certain precautions, Rindfleisch succeeded in making satisfactory injections of the marrow in the cancellous tissue of the ribs of guinea-pigs; by these same precautions, too, he found that the red marrow is red through its blood-forming cells, and not through the colouring matter of the blood within or escaping from its vessels.

The afferent arteries of the narrow-meshed capillary plexus of the marrow are slender; they penetrate to the middle of the medullary canal, and end as thin twigs running almost parallel to the axis of the bone, and, branching frequently at acute angles, they join the capillaries at a few points near the surface. These arteries hold hardly one-twentieth of the injection necessary to fill the veins and capillaries together. The veins, relatively thick, unite in every medullary cavity into at least one main trunk, which appears beset on all sides by its short secondary venules, the recipients of groups of true capillaries. At distinct points, emissary vessels leave the trunk for the surface of the bone. Hence red marrow has a very complete vascular system, hitherto unrecognized owing to the difficulty of injecting that structure.

Professor Rindfleisch then enters into a disquisition on the variations of blood-pressure, and on the mechanism by which such variations are almost nullified in parts where they would do mischief. He refers, at some length, to the well-known nature of the cerebral circulation. The brain is encased in an unyielding capsule. Pressure from within and from without the cerebral vessels is counteracted by this arrangement; the thin walls of the arteries of the brain show how the duty of resisting pressure is taken from them. Diminution or increase of blood-pressure rather aids the exit of blood from the cranium than induces anæmia or congestion of its contents. Yet the brain is, to a certain extent, amenable to slight accommodations of pressure through another mechanism: the cerebro-spinal fluid. Not so the bone-marrow; for it contains no similar fluid, and is inclosed in an absolutely unyielding capsule. Hence, says Rindfleisch, there is no question of any variations of pressure affecting the blood within the medullary vessels and the medullary structures outside them. The marrow, to carry on its important functions, is thus shielded from a source of disturbance. If blood-pressure increase toward the bones, the blood-current in the medullary vessels cannot distend them, since the bone without makes them unyielding, so it has simply to go on faster. This happens when there is any improvement in the volume of blood during convalescence; and the result is the more rapid washing away of certain solid blood-elements, which are, under these circumstances, much needed to repair loss.

What influence has this mechanism of the circulation in the marrow on the structure of the walls of its vessels? The thickness of the walls of a vessel bears a direct relation to the amount of pressure it has to resist; this is proved by the vascular changes in hypertrophy of the heart, by the increasing thickness of capillaries towards their arteries and veins, and by the extreme thinness of the walls of the cerebral arteries. After consideration of the above conditions, why should we not demand a minimum of wall for the capillaries of the marrow? Why should they possess any wall at all? Hoyer maintained, in 1869, that the veins of marrow have no walls. Rindfleisch authenticates this assertion. The veins of the red marrow, as well as the greater part of the capillaries, possess no special wall; whilst the arteries possess an extremely delicate membranous coat, completely disappearing at the commencement of the capillary system. A thin cellular tunica adventitia invests the artery at its entrance into the medullary foramen, but is soon lost further on. Nothing remains but a single muscular coat, and a simple epithelial tube within it. The capillaries are sharply divided into an arterial and a venous set. The arterial are given out at acute angles from the ends of their arteries; they are spread regularly, but not abundantly, over the whole marrow. They still possess a membrane, with long rod-shaped nuclei. Towards the venous capillaries these nuclei become longer and thinner, crossing each other and forming a kind of trellis-work, which probably represents not so much a wall as the dissolution of the closed walls of the vessels into the surrounding parenchyma. In torn fragments of medullary tissue, the arterial capillaries may readily be distinguished from the venous by their lesser calibre and straight course, and especially by the presence of a nucleated membrane on the surface of the blue mass of injection which fills their lumen after preparation.

The venous capillaries, having no walls, are difficult to study. Their calibre is twice or three times as great as that of the arterial capillaries. Their surfaces, or rather the limits of the injected medium, possess numerous offsets, which throw out thin straight tertiary branches, running in opposite directions, parallel to the axis of the vessels. Plastered all over the injection, filling these twigs, and projecting into their lumen, are large cells identical with those of the rest of the red marrow—a striking proof of the indefinite limitation of these vessels. The venous capillaries curve considerably as they enter the trunk veins. After the most careful experiments, Rindfleisch came to the conclusion that the veins are widely dilated sinuses, without walls, and running through the midst of the blood-corpuscle-forming medullary tissue. Through this arrangement, the productions of that tissue are readily abstracted and carried into the circulation.

To find the component parts of the medullary parenchyma, the vessels must be first thoroughly washed out with a weak solution of chloride of sodium. Then the observer may be sure he has only the parenchyma to deal with. First are seen the reddish-yellow nucleated cells. There is not one hair's difference between them and the nucleated red-corpuscles of fœtal blood. In the uterus of a guinea-pig, Rindfleisch found fœtuses in remarkably different stages of development at the same time. In the blood of a fœtus, five *millimètres* long, the nucleated were still in great majority over the non-nucleated corpuscles. The resemblance of the nucleated form to cells of red marrow was evident. As to their nuclei, no well-defined nucleoli could be detected, not probably from their being absent, but because their substance passes insensibly into the substance of the nucleus, as in all young rapidly proliferating cells. The nucleus is never in the middle of the red marrow cells. This is their great distinction from the permanently nucleated red corpuscles of the lower vertebrata. In the spleen of a bird, the equivalent of our hæmatoblasts can be found, but always with central nuclei. Of the significance of the non-central position of the nucleus in mammals more will be said presently. This nucleus appears separated from the protoplasm by a dim granular halo.

These nucleated red marrow cells undergo fission, commencing at their nuclei. The more quickly this process proceeds, the smaller will be the resulting red corpuscles. This point must be remembered with what was said above with regard to increased blood-pressure during convalescence, and what will be found below with regard to the appearances of blood at stated intervals in recovery from hemorrhage. Besides these cells, leucocytes abound in marrow. There are also "great-celled elements," probably altered forms of the marrow-cells just described; and also the well-known giant-cells, which Rindfleisch looks upon as deposits of formative material that has not been wanted. The absence of lymphatic vessels in marrow accounts for this accumulation. All the above cellular elements are considered by the author as organs of sanguification, and as no part of the permanent parenchyma, which consists of stellate fibres, composed of protoplasm, partly displaced by fat-cells. By a simple process of fatty degeneration, the red marrow becomes yellow.

Through what process, then, are the non-nucleated red blood-corpuscles developed from the nucleated hæmatoblasts of the marrow? Precisely in the same manner as the nucleated cells in the embryo precede the non-nucleated form. Rindfleisch searched specimens of marrow from numerous fœtal guinea-pigs. "Many a female guinea-pig," says he, "had to lay down her life without yielding that which was sought for." But at length he found four embryos, in which he could detect the transition of nucleated into non-nucleated blood-cells. He observed the nucleus, surrounded by a little colourless protoplasm, in the act of quitting the cell and leaving behind it a bell-shaped reddish-yellow structure, almost identical in form with a non-nucleated blood-corpuscle. This process must go on with great rapidity when it is necessary to make up for loss of cells from menstruation, anæmia, or debility. The bell-shaped body, being composed of soft, somewhat elastic material, soon assumes a rounded form when set free from its bed in the marrow and rolled along in the circulation, proceeding in one direction; so that it has the pressure of the stream behind it and the pressure of the resistance of the blood in front of it, which determine the biconcave form of the perfect red blood-corpuscles. The nucleus left behind accounts for the free nuclei which may be found in red marrow.

When fresh blood-corpuscles are required to make up for the loss of blood by accident or disease, the blood-pressure, increased by certain influences towards the medullary cavity, necessitates the exit of an extra supply from that cavity as fast as its entrance therein, since the blood is passing through unyielding structures. Red corpuscles are more rapidly formed. Rapid fission of the hæmatoblasts taking place, the corpuscles, under these circumstances, are smaller than normal. After bleeding a guinea-pig, its blood was examined on the third day, and numerous small red corpuscles were found side by side with those of natural dimensions. The number of these small bodies increased till the seventh day, then they diminished; so that, about the fourth week after the bleeding, not one single small corpuscle was to be found. In the blood of women after menorrhagia, similar bodies were detected, ultimately disappearing; and neither in this nor any other form of hemorrhage could an increase of white corpuscles be discerned. The deduction thus suggested by Professor Rindfleisch is obvious.

That in animals where the red blood-corpuscles are permanently nucleated, these, too, are developed from hæmatoblasts, there can be no doubt. Besides, from examining sections of the spleen of a young dove, proofs have been found of the origin of hæmatoblasts from white blood-corpuscles or leucocytes. The spleen is the chief blood-forming organ in birds; in mammals it plays a great part, being a store of hæmatogenous tissue supplemental to the blood-forming red marrow. Why the cells of the marrow have this tendency to form corpuscles is a question unsolved, but which does not refute Rindfleisch's theory. What has the marrow (says he) in common with the spleen or the blastoderm? Yet the two latter, quite different structures, have long been admitted to aid in the formation of blood. After extirpation of the spleen, vicarious sanguification has been found to be established in the mesenteric glands. In an anæmic child, rachitic and with general sclerosis of the cancellous tissue of the bones—which, of course, implied great changes in the red marrow—the greater part of the lymphatics, and even the cellular tissue in the tubes of the kidney, was discovered to be hæmatopoietic. Rindfleisch concludes by admitting that M. Hayem, in 1877, already pointed out the identical nature of certain cells in the blood and in the red marrow. In the small red-corpuscles found in the blood of convalescents, we recognize the French physiologists' "*globules nains*" described in the eighty-fourth volume of the *Comptes Rendus*.—*British Med. Journal*, May 22, 1880.

MATERIA MEDICA AND THERAPEUTICS.

On the Mydriatic Properties of Homatropin.

The discovery of a new mydriatic is a matter of practical interest to the ophthalmic surgeon. To atropia there are many objections; in some instances it is so irritating that it cannot be endured; and in all cases, when applied for the purpose of temporarily suspending the power of accommodation in order to make manifest the real state of the refraction of the eye, its effects continue an inconveniently long time. But much more serious than either of these is the proneness of atropia to precipitate an attack of acute glaucoma in certain conditions of the eye which otherwise call for the use of a mydriatic. Mr. JOHN

TWEEDY and Dr. SYDNEY RINGER (*Lancet*, May 22, 1880) bring to the notice of the profession homatropin, which promises to be of very great value and utility in ophthalmic practice. It is a bland and efficient mydriatic, rapid in its action, and of comparatively short duration.

Homatropin appears to possess many of the properties of atropia, but in a weaker degree. It must, however, be distinctly understood that, though relatively weaker than atropia, its action on the iris and ciliary muscle is really very powerful while it lasts. It is not merely weak atropia in the sense that it only does what a weak solution of atropia would do. A solution of the homatropin of the strength above mentioned widely and fixedly dilates the pupil in from fifteen to twenty minutes, and affects the accommodation in an equally rapid manner. The chief peculiarity, and in some respects the great advantage, of homatropin, is that its effects soon pass off, and certainly do not last anything like so long as those of atropia. Within four and twenty hours after an application the accommodation, after complete apparent suspension, recovers its pristine vigour, the pupil is less dilated, and reacts to light, though it has not quite regained its original size. As regards its action on the ciliary muscle, though decidedly more prompt, it is not quite so intense as that of atropia. Homatropin is, moreover, singularly unirritating. I have applied it to about fifty cases, and in not one was there the smallest sign of irritation or discomfort.

The homatropin used was obtained from Mr. Martindale, No. 10 New Cavendish Street, London.

Hypodermic Injection of Pilocarpine.

Dr. CIARAMELLI (*Giornale Internat. delle Scienze Mediche*, Anno 1, Fasc. x. xi.) contributes a carefully written paper on the therapeutic and physiological action of jaborandi and its alkaloid, as observed in his own practice. He has frequently administered the drug in cases of recent and large pleuritic effusions, but could never altogether satisfy himself that any benefit had been derived from this treatment. On the other hand, he witnessed very satisfactory results from the use of jaborandi in acute rheumatism, and in anasarca depending on acute or subacute nephritis, of which latter he gives two interesting cases. He recommends the following method of prescribing the drug, viz., jaborandi leaves three grammes (46 grains); infuse into 150 grammes of warm water; add two grammes of acetate of ammonia; and 25 of syrup; mix; the dose is one tablespoonful daily. As regards pilocarpine, its physiological action may be considered under two divisions, namely, the constant and inconstant; among the former he enumerates flushing of the face, a sense of heat, salivation, perspiration, rise of temperature, increased frequency of pulse and respiration; among the latter, an increase in the quantity of urine voided (in which he differs from most observers), and an increase in the nasal and lachrymal secretions. He saw vomiting occur only in one instance, and never saw any augmentation of the bronchial or intestinal secretions. He considers the phenomena induced by pilocarpine to depend partly on acceleration of the circulation, with increased tension, especially in the peripheral capillaries, and partly on a specific action exerted on the nervous centres.—*Lond. Med. Record*, May 15, 1880.

The Stigmata of Maize.

It is hardly a year since this remedy was first introduced into the ordinary routine of practice, and yet it may not be uninteresting to make an abstract of some of the papers which have been published in regard to it. Prof. CASTAN, at the Montpellier meeting, called attention to the stigmata of maize as a remedy which he had long known, and which he had found to be of great use in gravel and nephritic colic. In the latter disease there ensued after the administration of the drug a marked decrease in the painful symptoms, and he therefore supposed that the stigmata acted less as a diuretic than as a local anæsthetic. Prof. DENUCÉ, of Bordeaux obtained the most favourable results from its use in vesical catarrh, in which it appears to possess an elective action on the mucous membrane of the bladder. Dr. PONS, of Nérac, and Dr. QUEIREL, of Marseilles, had also frequently employed the stigmata of maize. M. Queirel observed that the pain was greatly alleviated in nephritic colic after the use of the remedy, but the urine was at the same time markedly increased in quantity. At the Therapeutic Society, M. CONSTANTIN PAUL stated that he was not convinced of the diuretic properties of the stigmata, although one of his colleagues had obtained some very striking results, the quantity of urine being in one case of dropsy increased from 500 to 1500 grammes after the ingestion of three spoonfuls of the syrup. Dr. LANDRIEUX has arrived at the following conclusions based on a considerable number of observations. (1) The various preparations of the stigmata of maize are of use in modifying the secretions of the urinary tracts. They may also be considered to possess a distinctly diuretic action. (2) The diuresis is rapidly produced, and the increase of urine is very marked after three or four days. (3) The diuretic effects are observed, not only in diseases of the organs concerned in the urinary secretion, but also in affections of the vascular system (diseases of the heart, bloodvessels, etc.). (4) The pulse is regular, the arterial tension is increased, whilst the venous pressure is diminished. (5) The remedy produces no disturbance of the nervous or digestive systems. The tolerance of the drug is complete and absolute, whilst in chronic cases its administration may be continued for three to six months without inconvenience. The different results which the use of the stigmata of maize has given at the hands of different observers, appear to be due in large measure to the fact that the strength of the extract varies, according to the nature of the soil, to the climate, to the time, to the mode of picking, and to the manner of drying the stigmata. The formula for the preparation of the syrup is not yet fixed, since the quantity of the active principles varies in different samples of the stigmata. The *Pharmaceutical Union* adopts formulæ which contain in one case six, and in another twelve grammes of extract to the kilogramme of syrup. The latter receipt is based on the assumption of a strength of 12 per cent. This quantity appears, however, to be too small, since the best samples of stigmata yield 25 to 30 per cent. of extract, or on an average 27.5 per cent. The kilogramme of syrup will therefore contain 27.5 grammes with this strength (27.5 pro mille). The daily dose of the syrup will be two to four spoonfuls, representing about one to two grammes of the extract. In all cases the syrup should be used in preference to an infusion of the stigmata of maize.—*Practitioner*, June, 1880, from *Le Progres Médical*, Feb. 14, 1880.

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On the Employment of Catgut for the Ligation of Arteries in their Continuity.

Dr. EUGENE BOECKEL, Surgeon to the Strasbourg Hospital, reports (*Gazette Hebdomadaire*, Feb. 27 and March 10, 1880) eight cases of ligature of the larger arteries with catgut, and from a comparison of these with other more numerous cases, which were reported by English surgeons (Transactions of Clinical Society, *Lancet*, 1877, vol. ii., pp. 574, 725, etc.), he deduces the two following conclusions: 1. That a catgut ligature, properly applied, obliterates in a permanent manner even large arteries. 2. That the reunion by first intention is easily obtained after these operations, provided that the rules of antiseptic surgery are strictly observed. In his own eight cases the incision of the ligature was closed in each at the end of three or four days. One of his patients (Case II.) left the hospital three days after the ligature of the brachial; another, seventy-nine years old (Case VIII.), got up ten days after the ligature of the femoral.

From the moment that immediate reunion becomes the rule after these operations, the field of surgery is wonderfully enlarged. We shall be able to approach the ligature of the subclavian artery within the scalenus, which until now has always caused death by secondary hemorrhage, as well as that of the primitive iliacus or hypogastric. And as for the ligations which usually succeeded with the old methods, after more or less prolonged suppurations, we can assert that the antiseptic dressing renders them so inoffensive that they are less exhausting to the patient than simple digital compression.

There is no further reason why we should seek for a better agent of deligation than catgut. While it is reabsorbed after a certain number of days, it none the less leaves the artery obliterated; it is a fact that has been verified too often to be any longer disputable. From what substance may we expect superior results? Undoubtedly, silk threads or metallic wires encyst themselves sometimes in the tissues without interfering with primary reunion. But they do not disappear, or, if so, only after long months, and often they cause suppurations which eliminate them even more slowly.

The only admissible objection to the use of catgut is that we do not always have on hand threads of this material which are of good quality. The country doctor and the army surgeon will often be obliged to do without them. Then, they may make use of a silk thread or a linen one boiled in carbolic acid; this thread is easier to prepare, to preserve, and to transport than catgut, and it is more like it, without, however, offering the same assurances for the success of the immediate reunion. But why surgeons, who are converted to the antiseptic method, should still reject catgut for ligatures of arteries in continuity, under pretext that it is not sufficiently resistant, I cannot explain, unless by the instinctive fear caused by its reabsorption. Experience and reasoning have proved equally that this fear is chimerical, and it ought not to prevent us in the future from making use of this valuable agent.

MEDICINE.

Fatty Embolism.

In 1860, H. Müller (*Würzburger Medic. Zeitschrift*) first observed the phenomenon of fatty embolism in man. While examining the eyes of a young man who had died of contracted kidney, he found that some of the choroidal vessels were filled with fat. This fat, to which he did not attach any importance, was supposed by him to have come from atheromatous patches in the aorta or other vessels.

Similar observations as to the presence of fat in the bloodvessels after death were afterwards made by several observers; but it was regarded as a mere curiosity till the appearance of a paper by Wagner in 1862 (*Archiv für Heilkunde*), in which, from the frequent occurrence of fatty emboli in pyæmic cases, and from the result of experiments on lower animals, the opinion was expressed that they were a common cause of pyæmia. The attention of German observers was now directed to this subject, and numerous monographs on fatty embolism have since that time appeared. Of these may be mentioned that of Bergmann, in 1863, who, directing his attention to the effects produced by the introduction of oil into the circulation, attributed the death which resulted in some cases to paralysis of the heart and œdema of the lungs; of Wagner, in 1865, in which an attempt was made to trace the origin of the fat in forty-eight cases of fatty embolism observed by him, fifteen of these being cases of rapid death after severe injuries of the bones and soft parts; of Busch, in 1866, who demonstrated that, immediately after injury to the medulla of a bone, fatty embolism of the pulmonary capillaries occurred, that the fat entered the circulation through the opened veins, and that it never caused abscesses or inflammatory disturbances—that, in fact, fatty embolism was of little importance, being only dangerous when in very large amount; of Cohnheim, in 1872, who clearly pointed out the existence of two kinds of fatty emboli, a non-irritating form which occurs after subcutaneous injuries, and an irritating form, where the fat is derived from the immediate neighbourhood of a septic wound; and of Flournoy, in 1878, who showed, among other things, that the conditions necessary for the occurrence of fatty embolism were, sufficiently large openings in the veins, the presence of free fluid fat in the neighbourhood of these open veins, and a sufficient *vis à tergo* (generally an extravasation of blood), and that these conditions most frequently occurred in fractures of bones, less frequently in injuries of the soft parts and after amputations or excisions.

In a recent monograph on this subject (*Untersuchungen über die Fettembolie*) Scriba has discussed the whole question at great length, and has brought forward many valuable facts. In order to obtain a pure fatty embolism, apart from any septic infection, he boils oil before injecting it, and uses various precautions in its introduction into the circulation. He first inquires into the fate of fat injected into the veins, and, with the view of determining this, he introduces the oil into the bloodvessels of frogs, while he at the same time examines with the microscope the circulation in the lungs, tongue, etc. He has also tested the urine of patients who had suffered injuries to their bones. As the result of numerous experiments, he finds that fluid fat when introduced into the circulation is caught in greatest part in the capillaries of the lungs, forming emboli. A smaller portion passes on into the general circulation, and either forms emboli in various organs, or is excreted by the glomeruli of the kidney, and appears in the urine. In man, the emboli in the lungs become detached in about eight days, pass on into the general circulation, and in part form emboli in other organs, in part are excreted by the kidneys, while at the same time the emboli in the various organs become loosened, and may be caught in the lungs. This cycle may be repeated several times. The greatest part of the fat is excreted by the kidneys, only a small portion remaining behind in the body. In support of these views, he finds that, as a rule, after fractures, oil only appears at intervals in the urine. Thus, at first, it is found on the second, third, and fourth days; then it disappears, reappearing again from the tenth to the fourteenth day, and again for a third or fourth time, at intervals of six to ten days.

Fat, however, cannot be looked on as an indifferent substance; not only does it act mechanically, it also probably acts chemically. For it has been found that, when oil is shaken up with blood, the red blood-corpuscles are in great part destroyed, some fragments only of them being found, while hæmoglobin appears in considerable quantities in the fluid. And in like manner, when the urine is examined in cases of fatty embolism, blood-pigment is often found, and, where casts are present, these contain it in a granular form. According to some, fat exercises a directly deleterious effect on the heart; Scriba, however, does not admit this, but, on the contrary, holds that the cardiac disturbances which occur after injection of oil are solely due to the altered conditions of the circulation, from blocking of the pulmonary capillaries.

Scriba has further investigated the changes produced in the lungs by the fatty embola. Oil was injected into the veins, into the medulla of the bones, and into the abdominal cavity of rabbits, and in all instances the pulmonary vessels were found to contain numerous fatty emboli. In performing these experiments, it was observed that rapid injection of the oil is more fatal than a slow injection. When injected into a vein close to the heart, an amount of oil which, introduced under high pressure, would cause immediate death, if injected slowly produces scarcely recognizable effects. The fatty emboli are bland, and are not, as Wagner supposed, causes of pyæmia or secondary abscesses. The fat does not pass through the walls of the capillaries, but the plug becomes loosened and carried on in the general circulation, as formerly described.

With regard to the quantity of fat required to kill an animal, he comes to the conclusion that varying amounts will be necessary, according to the *vis à tergo* and the distance of the point of entrance of the fat into the circulation from the heart. If the *vis à tergo* be but little or if the distance be great, so that the increased blood-pressure produced by the entrance of the fat is equalized before it reaches the heart, a healthy animal requires a very large quantity of fat to kill it. The shorter the road, and the greater the *vis à tergo*, the less is the quantity of fat required; but in no case does Scriba think that less than three times the amount of fat present in the femur of the animal would be able to cause death. On examining the animals which died of fatty embolism, it was found that the vessels of the brain were very markedly blocked with fat; while, when these emboli were absent, or only present in small numbers, death did not occur, even although the lungs were full of them. In no case did he find death occur from acute œdema of the lungs. He therefore concludes that, in pure fatty embolism, death occurs only in consequence of extensive embolism of the vessels of the brain and spinal cord, and is due to the arterial anæmia and consequent disturbances of nutrition produced by the emboli.

He gives the following as the characteristic symptoms of fatty embolism: presence of fat in the urine at intervals; transient attacks of dyspnœa; lowering of temperature; temporary slight hæmoptysis, without fever, and generally without dulness or *râles;* irregular action of the heart; collapse, with marked pallor of the skin and mucous membranes; at first, shallow respiration, at times interrupted by deep sighing inspiration, later Cheyne-Stokes's respiration; spasms of various kinds or paralyses, generally bilateral; diminution of reflex irritability.

Such are some of the chief facts made out by Scriba with regard to the phenomena of fatty embolism. The subject is certainly one of the greatest importance, and calls for further investigation. It is, indeed, strange that, in spite of the interest which it has excited abroad, it should have attracted but little attention in this country.—*British Med. Journal*, May 22, 1880.

Starvation Fever.

At a late meeting of the College of Physicians of Philadelphia Dr. J. M. DA COSTA reported three cases, occurring in the same family, of what he proposes to call "Starvation Fever."

The first case was a little girl, three years of age, pale, weakly, and irritable, who was seized, Jan. 1, with vomiting. She was very feeble, unable to sit up in bed, and complaining of giddiness. The next day the same symptoms persisted, and the pulse was small and very rapid. Subsequently there was marked fever, and the vomiting lessened; under quinia, beef-tea, brandy, and milk, the gastric symptoms disappeared. The fever was unattended with sore throat, eruption, or diarrhœa, was not of long duration, and by the ninth day from the beginning of the attack, the little patient, in good spirits, with appetite fully returned, was sitting up in bed playing, seemingly quite convalescent. On the 10th, vomiting returned; henceforth nothing was retained on the stomach; the child complained of not being able to see, became weaker and weaker, and expired exhausted on the 13th. The *autopsy* showed yellowish serous effusion in both pleural sacs. There was no evidence of lymphy exudation on the pleura; the amount of fluid was sufficient to have compressed the lower lobes of both lungs; the upper lobes were healthy. The heart was normal. The stomach was empty, its mucous membrane dryish and very pale; the intestines exhibited no swelling of any of the glands. The spleen was slightly enlarged; the liver had a nutmeg appearance; the kidneys were normal. The dura mater was somewhat congested, but free from adhesions; the pia mater was opaque; the cortical portions of the brain were œdematous; the convolutions were deep. A section of the upper part of the brain showed punctiform injection; the lateral ventricles were dry; but there was some effusion in the fourth ventricle.

The second case, a younger brother, four months of age, also a pallid, ill-nourished child, was seized with convulsions Jan. 10th. There was no retraction of the head; the urine was not albuminous. He had had a convulsive seizure two months previously, leaving apparently no trace. The convulsions of the 10th lasted until nearly evening, and some hours afterwards death took place. In the afternoon a few dark spots, like very small petechiæ, were noticed on the neck, and shortly before death similar spots were detected in the hypogastric region. The *autopsy* gave results similar to those in the first case. In all the thoracic and abdominal organs, evidences of profound anæmia; some serous effusion in the pleural sacs; stomach pale, containing a small plug of casein; absence of signs of glandular enlargement in the pale intestines, and a rather fluid blood, were the points specially noticed. Permission to examine the head was not obtained.

The third case was a little girl a year and a half old. She, too, appeared ill nourished, and was on Jan. 8th attacked with fever, with which was soon associated an acute bronchitis, and subsequently a circumscribed broncho-pneumonia. There was no sore throat, eruption, or albuminous urine. The child was well sustained, and under quinia and stimulating expectorants she slowly recovered in two weeks, having been very ill.

Dr. Da Costa was at first at a loss as to the nature of these strange cases. That they were not cases of scarlet fever, or diphtheria, or typhoid fever, was self-evident, though it was equally evident that in some general cause producing profound alteration of nutrition, or in some blood poison, was to be sought the explanation. The convulsions, the eruption, the speedy termination in the second case, suggested cerebro-spinal fever; but spinal symptoms were wanting, and the phenomena in the other cases were not at all those of this disease. The question of poisoning from bad drainage was carefully considered; the drains were everywhere in good order, and there was no water-closet or stationary wash-stand near the rooms in which the children played and slept. The supply of water in the house was good, and none of the adults suffered in the least from its free use. Attention was then directed to the food, and here a clue was obtained, which led to an unexpected discovery. The children lived almost entirely on cow's milk; the two youngest, exclusively; the eldest, almost exclusively; and, though taking large quantities, they did not thrive. Chemical analysis showed that the milk was skimmed, and diluted with one and a half parts of water.

The nature of the cases then became clear. In the anomalous fever, the local congestions, the vomiting, the stains on the skin, the convulsions, the ready collapse; in the collection of fluids within the serous sacs, the thinness and pallor of the mucous membranes, were the phenomena of inanition or starvation, as they have been experimentally demonstrated. To call these cases "Starvation

Fever," would, Dr. Da Costa thinks, be fully justified. Yet the question remains, whether some cause, in itself of little importance, did not act as an exciting cause to bring about the crash; some cause like a passing influenza, which, throwing the least weight on functions and organs incapable of resistance, broke them down at once. The fact of all the cases happening about the same time, and the catarrhal symptoms in the third case, favour this view.

Salicin in Acute Rheumatism.

At a late meeting of the Clinical Society of London (*Lancet*, May 29, 1880), Dr. Greenhow, President of the Society, reported ten cases of rheumatic fever treated with salicin. He stated that for some years past he has been in the habit of testing carefully and methodically in a series of cases the several remedies from time to time proposed for the treatment of rheumatic fever. During the last three years he had treated in the Middlesex Hospital ten cases with salicin, and fifty with salicylate of soda. All the patients were confined to bed until the fever had entirely subsided. The diet consisted of milk, beef-tea, and sometimes eggs; stimulants were sparingly given; the affected joints were wrapped in cotton-wool, and, when pericarditis or endocarditis was present, belladonna and iodide of potassium ointment was applied over the præcordia. In most cases simple effervescing medicine was prescribed on the day of admission, and aperients and occasionally sedatives were given, but the latter as seldom as possible. In all the cases treated with salicin, and in many of those treated with salicylate of soda, the urine was examined the day after beginning the medicine, and found invariably to yield the characteristic reaction with perchloride of iron. In order to exclude cases of mild type which, especially in young subjects, rapidly improve under any kind of treatment, the salicin or salicylate was not prescribed until the patient had been from twenty-four to thirty-six hours in the wards.

Case 1. First attack. Incipient pericarditis. Salicin in full doses on day after admission. Temperature began to fall on third day, became normal on sixth. Pains abated on second day, and ceased on fifth. The salicin taken every two hours for six days, then for two days every four hours, and for nine days every six hours. A mild relapse occurred whilst taking the drug. Epistaxis occurred in this case, and the heart's action became feeble, requiring stimulants. Discharged on sixty-sixth day. Case 2. Sixth attack. Admitted on fourteenth day. Mitral disease and pericarditis. Pain diminished on second day of treatment, ceased on sixth day. Temperature fell on third day, and became normal on fifth. Salicin given every two hours for six days, then every four hours, but, a relapse occurring, the frequency was again increased to two hours. Vomiting and headache became so severe that, at the end of ten days more, the drug was discontinued. Pleurisy and a second attack of pericarditis occurred. Discharged on 107th day. Case 3. First attack. Ailing several weeks. Pericarditis. Pains rapidly subsided and temperature became normal on the fourth day of taking the drug, but cardiac failure was very marked, and the salicin was discontinued on the eighth day. Discharged with an apex systolic murmur on twenty-fifth day. Case 4. Third attack. Old mitral disease, and a recent basic murmur. Pericarditis supervened two days after salicin commenced. The temperature soon fell to normal, but pains and vomiting did not subside with it. A mild relapse occurred after the salicin was discontinued; iodide of potassium was given, and patient discharged on fifty-eighth day. Case 5. Third attack; relapse; pericarditis. Temperature normal, and pains greatly subsided on fourth day. Epistaxis supervened, and pulse became small and feeble on the third day. Discharged on twentieth day. Case 6. First attack

Temperature fell to normal, and pains subsided after two days' treatment, but pericarditis developed. Pulse became very feeble; vomiting and epigastric pain occurred nine days after commencement of treatment, unrelieved by reduction in frequency of the drug, which was discontinued on the eleventh day. A relapse occurred, but salicin was not prescribed again. Discharged on forty-sixth day. Case 7. First attack; third day. Temperature fell to normal on third day of treatment. Pains and vomiting subsided more slowly. Salicin continued till twenty-third day, and patient discharged on forty-fifth day. Case 8. Second attack; tenth day. Temperature fell to normal, and pains subsided within thirty-six hours from commencing to take salicin, which, at first given every two hours, was afterwards reduced owing to feebleness of pulse, and omitted on the twelfth day. Discharged on twenty-third day. Case 9. Second attack; third day. Complicated with pneumonia. Temperature became normal on tenth day; pains continued a day or two longer. Sounds and impulse of heart became very feeble on twelfth day. Discharged on thirty-third day. Case 10. Second attack; sixth day. Double pneumonia and hæmaturia; endocarditis and pleuro-pericarditis. Pains in joints disappeared on the seventh day of treatment, but temperature remained high until after the salicin had been discontinued, on account of persistent and uncontrollable sickness. Chloral and morphia were required frequently at night, and stimulants were freely given on account of the dyspnœa and feeble and irregular action of the heart. Twenty grains of salicin were given every two hours for seventeen days. It caused sickness at a very early period, and after a few days dryness and soreness of throat. Discharged on fifty-eighth day.

Thus the effects of the drug were not very satisfactory. The temperature appeared to be reduced and the pains to subside in the uncomplicated cases; but, in Cases 1, 2, 4, and 6, relapses occurred when the salicin was either discontinued or the frequency of the dose diminished. Case 5, one of relapse, had already been laid up some time, and recovery might have been as rapid under simple rest and diet; while in 9 and 10, complicated with pneumonia, the salicin did not appear to exert any influence on their progress. On the other hand, salicin appeared to produce some inconvenient consequences. In one case epistaxis, which recurred when the dose was increased; in four cases marked cardiac depression: nausea and vomiting in two cases. Lastly, the detention of the patients in hospital was not shortened by the treatment; for, except Cases 3, 5, and 8, two of which were approaching their close when admitted, the patients treated with salicin recovered more slowly than is common in cases of similar severity under other modes of treatment.

Salicylate of Soda in Acute Rheumatism.

At the same meeting (*Ibid.*), Dr. GREENHOW also reported fifty cases of rheumatic fever treated with salicylate of soda. He discussed, first, the physiological, and then the therapeutical, effects of salicylate of soda.

One of the most obvious effects of the treatment in the majority of cases was a speedy fall in temperature, sometimes within a few hours from commencing the treatment, and, save in a few cases, within two or three days. The pulse usually, but not invariably, came down in frequency with the fall of temperature. In forty-five of the fifty cases certain well-marked physiological symptoms attended the reduction of the fever. There were effects on the nervous system, such as deafness, vertigo, headache, noises in the ears, delirium, and hallucinations. Deafness often occurred early, and was noticed in twenty-seven cases. Sometimes it was very intense. Vertigo occurred in fourteen cases. Very intense headache, chiefly frontal, though less frequent than deafness and vertigo, was, when it occurred, a much more distressing symptom. It was complained of in nine cases, and in some recurred with the resumption of the medicine. Delirium was present in eight cases, hallucinations in four. Great depression of pulse and action of the heart was the most important effect produced on the circulation, more or less weakening of the pulse, calling for stimulants in almost every case, great weakening of the impulse of the heart, and in ten cases almost complete obliteration of the first sound; in some, an irregular or dicrotous pulse. Vomiting occurred in twenty-two cases; great injection of the tongue in many cases; soreness of the fauces in three, and an aphthous state of the tongue in three cases; diarrhœa in two cases was evidently referred to the salicylate; epistaxis occurred in seven cases; in two transient albuminuria was observed; in two others tremor of the hands and tongue, which may not have been due to the drug.

Speaking of the therapeutical value of salicin and salicylate of soda in acute rheumatism, Dr. Greenhow said that his experience led him to regard these as the most powerful antipyretic agents with which he was acquainted. The temperature soon falls under their use: the pulse commonly falls at the same time, and the pains soon abate very considerably, and in most cases entirely cease within a few days. But the improvement in the symptoms only takes place coincidently with the development of one or more of the physiological phenomena already described; and in all the most acute cases the relief derived from the medicine passed away soon after the treatment was intermitted, and a relapse—in some cases several relapses—took place. On this ground these agents cannot be regarded as in any respect specifics in the treatment of rheumatic fever. Excluding two cases, which passed into the state of hyperpyrexia whilst under the physiological influence of salicylate of soda, two other cases, which proved fatal, and about fourteen very mild cases, from which no conclusions could be drawn, there were relapses in twenty-one out of the remaining thirty-two cases. In seven of these twenty-one cases there was only one relapse; in nine there were two; in two there were three; in other two four; and in one five relapses. A proportion of twenty-one out of thirty-two was a large one for relapsing cases, and in most of the cases the relapse was due to the passing off of the influence of the medicine.

The paper concluded as follows: "Fully admitting, therefore, the great immediate relief that appears to follow the use of those agents in the treatment of rheumatic fever, there still remains for consideration the further question whether, upon the whole, the treatment is successful. The answer to this question must depend upon whether the complications which are apt to arise in rheumatic fever are less frequent under this treatment; whether the condition of the patient after recovery is better or worse than under other modes of treatment; and, lastly, whether the length of time during which the patient is disabled is shorter or longer under this than under other modes of treatment. To all these questions my experience leads me to reply in the negative. We might have, perhaps, expected that hyperpyrexia at least would have been prevented by the use of such a powerful antipyretic agent, but the first two cases I have recorded negative this expectation, for hyperpyrexia was developed in both of these after the proper physiological influence of the salicylate of soda had become manifest. Pericarditis was present in many cases before the treatment was commenced; but, in several instances, it supervened afterwards. In three cases pneumonia, and in four others pleurisy supervened, when the physiological effects of the medicine had become manifest. On the other hand, several cases that were admitted with either pleuro-pneumonia, broncho-pneumonia, or bronchitis ran very much the course we are accustomed to witness in similar cases under other treatment.

"Patients treated with salicylate of soda appeared to me to become unusually anæmic and to regain health and strength very slowly. They are long in becoming fit to resume their occupations, and their recovery has appeared to me more tedious than has been the case with patients treated on other methods. Excluding the two cases of hyperpyrexia, the two fatal cases, and nine very mild cases, which were on the average less than twenty days in the hospital, and, perhaps, recurred neither more quickly nor more slowly than such cases commonly do, I find that the remaining thirty-seven cases were on an average fifty-seven days each in the hospital. This period, however, by no means represents the duration of their disabling illness, for all had been at least a few days ill previous to admission, and probably none was discharged in a condition to resume work, many having been sent to convalescent hospitals, and others to their friends in the country to recruit. If now we examine into the duration in hospital of the cases treated with salicin, a very similar result is shown. Two cases which were admitted in an advanced stage of their illness being excluded, the average residence in hospital of each of the remaining eight cases was fifty-five days. With regard therefore to the treatment of rheumatic fever with salicin and salicylate of soda, we must, I think, come to the conclusion that most physicians did with regard to the treatment with blisters—viz., that the pain and distress of the patients are undoubtedly for a time greatly assuaged, but that the duration of the illness is not shortened. Of the two plans, I am of opinion that blisters applied in the vicinity of all the painful joints are by far the most efficacious and speedy in the relief they afford, and have the advantage of not producing so much subsequent debility.

"Another question now presents itself for our consideration, namely, whether it is not possible that some injurious consequence may result from the powerful action of the medicine upon the heart; and I am bound to express my fears that the marked weakening of the first sound of the heart present in so many cases indicates the exertion of an influence upon the muscular structure of that organ, which may not always pass entirely away when the treatment is suspended, and more particularly when either inflammation of the endocardium or pericardium or of the muscular structure itself exists during the treatment."

Mr. H. DAVY said that having himself been thrice the subject of rheumatic fever his experience might be acceptable. He believed that it is a very difficult matter to rightly estimate the value of various kinds of treatment, and he could not help thinking that many physicians had arrived at different conclusions from those of the President. When house-physician at Guy's Hospital he had carefully watched some twenty or thirty cases, and from this experience he believed that, although these drugs do not prevent complications arising, they relieve pain and pyrexia, and that cases so treated are more free from complications and relapses than appeared from Dr. Greenhow's experience, nor had he seen any serious vomiting occur. After Dr. Maclagan's statement as to the superiority of the salicin over the salicylate, he had prescribed the former, and although hallucinations, light-headedness, deafness, etc., were frequent, they were of small importance in comparison to the amount of relief given to the patient. Relapses were quite as much due to a too early return to fish diet as to the drugs. In his own three several attacks he had been under different treatment; the first time—a mild attack—he was treated by a country practitioner with opium and bleeding; the second time, when the rheumatism was complicated with scarlet fever, he was treated by a London physician with alkalies and without milk. The attack was brief, but he was anæmic for some months after. The last time he prescribed for himself under Dr. Taylor's supervision. He took fifteen grains of salicin every two hours, and in two days the temperature had fallen from 103° to normal, and in ten days he was out of bed; whilst taking the drug he had slight deafness and hallucinations.

Dr. H. **Weber** said that the results arrived at in his previous paper were indifferent, but the conclusion he came to was that the treatment was on the whole more successful than any treatment he had formerly applied. Since that time he had given these drugs in many cases, and his results had not been so unfavourable as the President's. He had found that, among forty-four patients treated with salicylate of soda, the average number of febrile days, including relapses, were fourteen; whereas in seventy cases otherwise treated the average number of febrile days were nineteen. He had not included the number of days in hospital, because in the German hospital most of the patients, being homeless, were retained longer than usual to prevent relapses. He thought that complications were not so frequent in cases treated by the salicylate; and since he had employed it he had not seen any cases of hyperpyrexia. As a rule, the urine yielded the perchloride of iron reaction on the first or second day of treatment by salicylic acid, but not by salicin. The author had not endeavoured to explain how salicylate of soda acts; he seemed to imply that it acted merely by reducing the heart's action. He himself (Dr. Weber) admitted this effect on the heart; but suggested that these drugs may act by a process of fermentation in the blood; for salicylate of soda diminishes the amount of sugar in diabetes. And he had found in cases where there is a rapid formation of bacteria in the urine, that the salicylate of soda diminishes this tendency.

Dr. **Cavafy** said that his own experience of these drugs in acute rheumatism dated from 1876, and he had frequently observed the effects of salicylate of soda given in considerable doses—*e. g.*, half a drachm every two hours at the beginning, with a subsequent diminution in dose and frequency. In some particulars his experience was not in harmony with Dr. Greenhow's; for instance, that improvement only occurs coincidently with the development of toxic phenomena. Only a small percentage of his cases showed toxic effects. Nor did he think too much importance should be given to those unpleasant symptoms of deafness, tinnitus, delirium, etc.; they were distressing, but did not result in permanent harm; and they could be controlled by remitting one or two doses, or they subsided when tolerance was established. The proportion of cases of albuminuria out of fifty was a small one, and probably due to some accident, rather than to the drug. The relapses depend much upon the time during which the drug is continued in small doses. After saturation with the drug, if its administration be continued in small doses for a longer time than usual, relapses may to a considerable extent be avoided—especially if the diet is kept low. To be sure, in some cases recovery was tedious, but that is often the case in rheumatism. Still, in cases which are moderately severe at the onset, it was possible to get the patient out of bed in five days. He had met with a case of a lady who had previously had two attacks of rheumatic fever, of long and tedious duration, confining her to bed for many weeks. On the third or fourth day of her third attack, temperature 102.8°, swelling of several joints, and turbulent cardiac action. She was placed upon salicylate of soda in twenty-grain doses, and within a week was up and about. There was no relapse. Dr. Greenhow's cases included two fatal ones. Had the drug any share in this result? The weakening of the first sound of the heart may be due to the pyrexia.

A Rare Case of Vaso-motor Neurosis of the Lower Extremity.

At a late meeting of the Société Médicale des Hôpitaux (*Gazette Hebdomadaire*, April 9, 1880), M. **Straus** read a paper on the following rare case of vaso-motor neurosis of the lower extremity. A man, thirty-five years old, a business employé, entered the Tenon Hospital on the 19th June, 1879, on account of rheumatic pains in the right shoulder and left foot. He had no fever, no cardiac complication, the pains lasted for eight days, and rapidly yielded to rest and salicylate of soda. The patient was considered convalescent, when M. Straus observed on the left lower extremity the following curious vaso-motor phenomena:—

Even when the patient is lying down, the foot and toes of the left side are the seat of marked turgescence with obliteration of the course of the tendons and red coloration of the skin. To the touch, there is a noticeable increase of temperature, in comparison with the healthy side. This turgescence, which is in no wise painful, does not extend beyond the ankle. The articulations of the foot and tarsus are entirely free and painless. When the patient is sitting down, with the legs hanging, the swelling and coloration of the members increase, especially on the toes and front part of the foot, without extending beyond the instep. The standing position still further increases the symptom, which reaches its maximum when the patient has taken a few steps; then the foot and toes of the left side become violet, as if phlegmonous, and the veins become conspicuous under the skin. There is no trace of varicose veins.

Walking is very painful, and can only be done on the heel alone; the patient cannot wear his shoe on the left foot; after a few minutes, even when making use of a crutch, walking becomes impossible. There are no disturbances of sensation, with the exception of pricking in the left foot; there is no paresis, or atrophy of the muscles, which respond readily to electricity.

He says, that on several occasions, during ten years of military service, after being fatigued, or after forced marches, he has felt pain and swelling in the left foot, which prevented him from walking for several days or even weeks. He was under treatment for rheumatic pains, neuralgia, etc.

These singular vaso-motor phenomena continued during the two months that the patient remained in the hospital. They were analyzed with care, especially the differences of temperature. Minute measurements were made almost daily, and showed a constant difference between the foot on the left, and that on the right side, increasing from 2 to 4 degrees centigrade, and varying according as to whether the patient was lying down, standing, had walked, had his legs covered, etc.

On the 6th of August, 1879, he was so much better, that he could put on his shoes, he could walk, and was taken to Vincennes, but the vaso-motor paralysis still continued, as well as the thermic modifications.

During the past winter the patient has been able to resume his trade, and to take quite long walks, but in spite of the severe cold he could not put his feet near the fire. The left foot is always turgid and highly coloured, and between the two extremities the difference in temperature is 2.5° Cent.

M. Straus refers to the important paper of Dr. Weir Mitchell, which appeared recently, and relates to cases which are almost identical (On a Rare Vaso-motor Neurosis of the Extremities, in the *American Journal of the Medical Sciences*, July, 1878). He also recalls analogous facts observed by M. Vulpian and M. Sigerson, and, finally, to a recent observation by M. Allen Sturge, of London (see *American Journal of the Medical Sciences*, July, 1879, p. 258). Perhaps the disease is not so rare as it has appeared to be, and is often confused with rheumatoid conditions, paralysis, varicose veins, etc. M. Straus finishes his communication by a comparison between this vaso-motor neurosis and that described by M. Maurice Raynaud under the title of local asphyxia and symmetrical gangrene of the extremities.

Do the vaso-motor disturbances in question (whether they be of a vaso-paralytic or of a vaso-dilatative origin) relate, as thinks Dr. Weir Mitchell, to a disturbance of the vaso-motor medullary centres? M. Straus does not dare to decide, but he inclines towards an opinion broached by M. Vulpian on the subject of symmetrical gangrene of the extremities, and according to which these vaso-motor disturbances would not necessarily proceed from a central spinal origin; they could result from the modifications (reflex or otherwise) sustained by the numerous peripheral ganglia which exist near the terminations of the nerves in the vessels, and which control, in part, their innervation. The clearly defined *unilaterality* of the vaso-motor disturbances, in this case, seems to be an argument against the spinal localization of the disease.

M. Dujardin Beaumetz stated that he had been attacked by symptoms similar to those described by M. Straus. But their etiology was different. They appeared in consequence of the rupture of the tendon of the left patella.

Eruptions Caused by Internal Use of Chloral.

The facts recorded at a late session of the Société de Médecine Pratique (*Bull. Gén. de Thérapeutique*, Feb 15, 1880), complete the inquiry opened in London, which has been made the subject of a report by Doctor Farquharson to the Clinical Society of London, and which we published in our last number (see p. 533).

M. Brochin made a communication on the inconvenience of chloral, and reports the case of a young strumous girl who was attacked with eczema of the lips, who, on two different relapses, saw the affection return immediately after the administration of a potion and a wash of chloral, and that with such intensity that the mouth and tongue were attacked; this curious case of buccal eczema has been submitted to the diagnosis of M. Bazin, who confirmed it.

M. Limousin stated that he was acquainted with these facts of chloralism; the eruption consists in a reddening of the face, almost like erysipelas, disappearing with the suppression of the medicine.

M. de Boyer has seen in M. Bouchut's practice these scarlatiniform eruptions, but without angina, develop themselves in the cases of choreic patients submitted to large doses of chloral. They disappeared spontaneously.

M. Gillet de Grandmont has observed five analogous cases with manifestation of erythema on the eyelids and around the neck.

M. Grellety has noticed that the irritating contact of the chlorine with one portion, and its elimination from the other, must play the principal part in the production of this singular buccal eczema; but this erythema is controlled by an individual susceptibility which is often met with among the dermopathies; it is thus that the use of alcohol, and of coffee is sufficient to act as a spur to certain eczemas; in all cases there exists a personal idiosyncrasy for which we must make allowance from a therapeutic and dietetic point of view.

SURGERY.

On New Methods of Removing Intra-laryngeal Growths.

To the two well-known methods of removing laryngeal growths, viz., the intralaryngeal operation, in which the growth is removed by various forms of knives, forceps, etc., through the mouth with the aid of the laryngoscope, and the extralaryngeal operation, or thyrotomy, in which the thyroid cartilage is split in the middle line and the growth removed through the wound, Professor

ROSSBACH, in the *Berliner Klinische Wochenschrift*, No. 5, 1880, adds a third. His operation is a subcutaneous one. Professor Rossbach states that it is easily and quickly performed, is almost painless, requiring no anæsthetic, is attended with the escape of only a drop or two of blood, and is quite devoid of danger; the wound, moreover, heals very rapidly, and requires no after-treatment. A small spear-pointed knife is introduced through the middle line of the thyroid cartilage, a little below the notch, and is pushed through the mucous membrane into the larynx. With the aid of the mirror the knife is then guided to the growth, and its pedicle or base cut through. After the first prick in the skin, the patient experiences no further pain. He does not feel the entrance of the knife into the larynx, and its presence there causes neither coughing nor gulping. Should, however, any such spasmodic movements accidentally occur, the knife need not be withdrawn, but may be allowed to remain passively in the larynx, the handle being merely supported by the thumb and forefinger placed lightly on the thyroid cartilage, so that during the up and down movement of the larynx the hand, knife, and cartilages move as one piece. With this precaution, wounding of the mucous membrane will be prevented. Professor Rossbach has operated by his method on two patients with entire success. He has also demonstrated, in a large number of experiments on animals, the ease with which the knife can be manipulated in the larynx when introduced subcutaneously. In this way, he states, he has removed in animals both vocal cords, and in one case has separated the whole of the mucous membrane from the interior of the larynx. Professor Rossbach was led to devise his operation in consequence of having failed to remove a polypus from a patient who could neither tolerate the presence of instruments in the larynx when introduced in the intralaryngeal manner, even after months of practice, nor would submit to thyrotomy. The advantages of this operation in such cases he considers obvious. But he also thinks it preferable in a large number of cases usually treated in the intralaryngeal way, since it is more easily performed than the latter operation, and causes much less inconvenience to the patient.

In the same number of this journal, another operation for removing laryngeal growths is described, which, however, is only a modification of what is generally known as subhyoid pharyngotomy.

Dr. CARL LANGENBUCH, after administering an anæsthetic, makes a transverse incision through the skin between the hyoid bone and thyroid cartilage, separates the muscles from the hyoid bone, and cuts across the thyro-hyoid membrane immediately above the upper border of the thyroid cartilage, and then makes a median incision through the three-cornered portion of the membrane which lies in the notch of the thyroid cartilage, continuing this incision, as he says, perhaps unnecessarily, through the upper third of the thyroid cartilage. He next divides the root of the epiglottis, and exposes the interior of the larynx by drawing the thyroid cartilage downwards and forwards by means of strong hooks, so that the growth can be removed through the wound. The operation is attended with but very slight hemorrhage. Dr. Langenbuch states that he has not found this operation described in the larger works on surgery; a similar method of opening the larynx was, however, employed by Professor Roser in 1851 when making some experiments upon animals.—*London Med. Record*, May 15, 1880.

Nephrectomy by Abdominal Section.

At a late meeting of the Royal Medical and Chirurgical Society (*Lancet*, March 13, 1880), Mr. A. BARKER read a very interesting paper on this subject and reported an unsuccessful case in which a movable kidney affected with encephaloid was extirpated.

Mr. Barker stated the reasons which induced Prof. Simon, of Heidelberg, to plan and carry out in 1869 the first case of nephrectomy designedly performed on the human subject. He shows that Simon had been preceded by two American surgeons in the mere removal of the kidney. He points out the importance of Simon's experiments on animals, and his main conclusions therefrom—1. That this operation is as well borne in the first instance by the system as others now fully recognized, such as excision of the uterus or ovary. 2. That the sudden removal of one kidney does not so far affect the urinary functions as at all to influence the question of the operation. 3. That the health of the animal may be quite as good after as before, and without any uræmic troubles, hypertrophy of the heart, or other evils.

The question as to whether these conclusions hold good for man is then shown to have been settled in many respects by the effect of the operation in Simon's first case, and in many since recorded. Of these the author has collected twenty-eight from home and foreign sources in which from various causes a kidney has been removed. These he tabulated under the headings "operator's name," "sex and age," "diagnosis or object of operation," "duration of complaint," "date of operation," "situation of incision," "form of dressing," "treatment of pedicle," "symptoms after operation," "result, immediate and eventual," "hemorrhage after or at operation," "condition of organ removed," "remarks" on points of interest about the various cases. From this list two cases are first quoted which seem to prove more conclusively than any experiments on animals that neither the incision down to the kidney in the loin, nor the ligature of its pedicle and its removal, need cause any great disturbance in the system. In neither of these cases did this result. The organ in both had been wounded by a stab with a knife, and prolapsed, and was removed easily and without any ill effect. It was the study of these and a number of the others tabulated which led the writer to operate in the present case. He found that out of the twenty-eight attempted nephrectomies, six were done on a wrong diagnosis; in two for neoplasms the operation was left uncompleted, owing to difficulties experienced in the isolation of the organ. Of the remaining twenty undertaken with the distinct object of removing the kidney and completed, the objects were the following: Two for fistula of the ureter, both successful; two for acute pain in the kidney (cause unknown), one death, one recovery; two for calculous pyelitis, both fatal; three for injury of the organ, two complete recoveries, one fatal; six for acutely painful movable kidney, four complete recoveries, two deaths; four for neoplasms (one obscure, however), one death, three recoveries; finally, one pyonephrosis, perfectly successful.

Of the whole twenty-eight, there are fourteen recoveries and fourteen deaths; but, excluding the six for wrong diagnosis, there are still thirteen successful and nine fatal; two of the latter, however, were desperate and left uncompleted. The causes of death were—peritonitis, four (abdominal section in all); pyæmia, one; in one, cause not given, patient died sixty-five hours after; in one the cause is stated to have been unexplained by the autopsy, "the patient died within a week;" two died of shock ten hours after operation (both desperate cases). In all the successful cases recovery was complete, possible recurrence in two excepted (neoplasms). Of the thirteen recoveries nine were lumbar sections, four ventral; of the nine fatal, five were lumbar, four ventral. On the whole, a careful examination of all the records convinced the author that nephrectomy is not accompanied by any peculiar shock or risks apart from those attending most grave operations, and that it is well borne in many cases; that as an operation it has a most useful future before it when we have learned to select proper cases and have better studied the operation itself

As to the mode of procedure, he would, from experiment on the dead body and careful comparison of those operations already recorded, feel inclined for the present to adopt the following conclusions: The lumbar operation appears best suited for removal of healthy or comparatively healthy kidneys; also when there has been much perinephritic inflammation, old or recent; also for pyo- and hydronephrosis, and perhaps for the smaller new growths of the organ, especially if fixed. The ventral incision, appears, on the other hand, best suited for taking away movable kidneys, whether healthy or affected with neoplasms, especially if the latter be large; also for the ordinary cysts of the organ not fixed by inflammation. The difficulty, in the case of the neoplasmata, of removing the lymphatic glands in and about the pedicle of the kidney (which are known to be an early seat of recurrence) by the lumbar incision, would influence him much in favour of abdominal section, by which the root can be better reached.

The present case was as follows: An unmarried female, aged twenty-one, had had lumbar pain for eight months before admission into University College Hospital. Three months before admission a medical man diagnosed a movable kidney. She suffered much from this time onwards from intense pain, with frequent nausea, and even vomiting and hæmaturia, preventing all work for considerable periods. All this was aggravated from the time of admission. Diagnosis: movable kidney, and possible new growth in it; later on, after observation, movable kidney affected with encephaloid. The hæmaturia was almost constant and often profuse during her fifty days' stay in hospital. The attacks of pain were very severe and she was much weakened. On Dec. 22, 1879, an operation was performed like ovariotomy in almost every respect—strictly antiseptic. Little difficulty was experienced in the ascending mesocolon, though this had to be done with the utmost care, as the tumour was very soft in places; ureter was tied separately; pedicle in two portions by transfixion, with twisted silk. The operation was almost bloodless. Patient bore it well, and showed little shock. Twenty-four hours later she was as strong as before the operation; eight hours later she began to get weak, with hurried breathing, as in attacks before observed; diagnosis, possibly thrombosis. Death occurred at the end of the second day. Cause discovered to be thrombosis of pulmonary artery. The autopsy showed the abdominal cavity to be all that could be desired; repair already far advanced; no trace of cystitis; no evidence of embolus from renal vein, but large thrombus firm and light-coloured in right ventricle of heart and pulmonary artery. Small secondary deposits in lungs and lumbar lymphatic glands; suspicious specks in liver; other kidney healthy.

Mr. DAY narrated the history of a case successfully operated upon by Mr. Knowsley Thornton. The child was seven years of age, and came under notice in October last with a large cystic abdominal tumour, of five years' duration. Her general health had not suffered at all; the urine was scanty, but natural. Various opinions were given as to the nature of the case, and Mr. Thornton drew off six pints of fluid by the aspirator, the fluid having the characters of urine, and being slightly albuminous. The cyst gradually refilled, and on January 2d was removed by Mr. Thornton. The highest temperature after the operation was 101.6°. In reply to Dr. Southey, Dr. Day was unable to state whether urea was found in the fluid. (This case is reported in full in the current number of the *Medical News and Abstract.*)

Mr. KNOWSLEY THORNTON said that having made the diagnosis of renal cyst, he confirmed this by the aspirator, and then suggested the advisability of its removal. He came to the conclusion that in such a case as that abdominal section was preferable to the lumbar operation, being strengthened in that view from finding in a case of pyonephrosis which he had incised about eighteen months previously, how difficult it would have been to secure the pedicle through the lumbar wound. One point laid stress on in the diagnosis of the case was the passage of the descending colon in front of the cyst, which, when distended, pushed between the layers of the mesocolon towards the median line of the abdomen. In operating he began his incision about one inch above and to the left of the umbilicus, and carried it down about an inch and a half below that part. He found afterwards that it would have been better to have made the incision about an inch higher. Owing to the child taking the anæsthetic badly, the vomiting and straining caused the intestines to appear at the wound, but this was the only difficulty encountered. After laying open the peritoneal capsule the cyst was shelled out, and its pedicle brought into view by drawing the cyst forwards. The renal artery and vein were first secured separately about an inch from the aorta, and then the whole pedicle embraced in a third ligature, as in Mr. Barker's case. The operation lasted nearly an hour and a half, and no shock followed. Immediately after the operation, temperature 97.8°, pulse 110, respiration 28. Much vomiting followed, and in the evening the temperature was 101.6°, pulse 150, respiration 32. For about the first twelve hours the urine passed was scanty, and contained much blood; but at 3 A. M. next day it was clear and deposited much urates. He found that the bloody urine did not decompose like that which contained no blood; for some days afterwards it was still free from odour and from bacteria. This seemed to indicate that the hæmaturia was really due to absorption of carbolic acid, and not to derangement of renal function from the extirpation of one organ. The child was up on the eleventh day after the operation, and had now just returned from a convalescent home. With regard to the general question of the method of operation, Mr. Thornton held that in cases of hydronephrosis abdominal section was to be preferred to the lumbar operation, as advised by Mr. Barker; but in cases where sinuses existed or adhesions, removal by abdominal section would be very difficult. The great advantage of abdominal section was that it allowed the operator to actually see the pedicle.

Mr. Clement Lucas considered extirpation of the kidney by either method to be perfectly justifiable; and it had been shown that one kidney could be removed without injurious effect. The choice of the operation must depend on the conditions of the case, *e. g.*, it would be impossible to remove a large mass through the loin. The chief dangers were secondary hemorrhage and thrombosis extending from the divided vessels. He inquired if Messrs. Barger and Thornton cut the ligatures on the pedicle close?

Mr. Barker and Mr. Thornton replied in the affirmative.

Mr. Lucas, continuing, said that if it were possible to see the renal artery, so as to grasp it well with forceps, then torsion should be employed. He could not understand why torsion was so little practised. At Guy's they did not know what secondary hemorrhage was since torsion had been employed, and it could be safely applied to arteries as large as the renal. Three weeks ago he had excised a kidney by the lumbar method. The organ had been suppurating for six years, and the abscess had been opened by Mr. Howse. The man recovered sufficiently to go to work, but suffered much pain. The fistula in the loin remained open, and pus was passed in the urine occasionally. Six months ago urine was passed through the loin. He was kept in the hospital for three months, and it was observed that when the sinus in the loin became blocked the quantity of urine passed from the bladder was not appreciably increased. This occurred several times and proved that the diseased kidney was not doing much work. Extirpation was performed as follows: A vertical incision, as for colotomy, was made from the last rib to the iliac crest outside the quadratus. Great difficulty was experienced in detaching the organ owing to adhesions, and the incision was enlarged laterally to the extent of an inch and a half. The surface of the kidney was now exposed and ligatures placed round the pedicle, the vessels being tied separately from the ureter, and the organ removed. The case did well until a week ago, when hemorrhage (apparently started by accidental manipulation) set in, and recurred in spite of plugging. Mr. Lucas reopened the wound, which was lined by granulations, and passed a loop round the pedicle. This not controlling the hemorrhage, he, as a last resort, plugged the wound with two sponges soaked in a solution of perchloride of iron. There had been no recurrence of bleeding since then, and the patient was recovering from his anæmia. The sponges had not yet been removed.

Mr. SPENCER WELLS had seen Professor Simon, of Heidelberg, remove a kidney through the loin in a case of ureteral fistula following ovariotomy. The case was successful. Mr. Wells had repeated the operation on the dead subject, and found but little difficulty in it. Mr. Barker had included in his tables a case of his own, which occurred to him ten years ago. It was a case of a large cyst of doubtful origin. An exploratory incision gave exit to a large quantity of bloody fluid, and Mr. Wells was obliged to remove the cyst. It had a capacity of fourteen pints, and seemed to be connected with the uterus. The kidney, which was adherent to the cyst, but was free from disease, was removed with this, the renal artery being secured by torsion. The patient only survived three days, dying probably from septicæmia, for it was before he had adopted antiseptic measures in his cases. There was no uræmic symptom.

Mr. HAMILTON CARTWRIGHT instanced the following interesting fact as showing how much injury may be done to a kidney, and how little effect follow its removal. Some years ago, when in the Yang Tse River in China, he was shown by the doctor of an American vessel, also lying at anchor there, a specimen of a kidney. It had protruded from a wound in the loin, and had been dressed, according to Chinese fashion, with a mixture of bird's dung, saliva, etc.; and when the man was seen by the doctor the organ was in a state of putrefaction. Mr. Cartwright's acquaintance thereupon removed the mass, after which the patient, who had simply taken a pipe of opium during and after the operation, disappeared. He returned, however, in two or three weeks' time, and, as showing his appreciation of the services rendered him, brought with him another man suffering from cancer of the tongue.

Mr. BARKER recommends (*Lancet*, April 17, 1880) as an aid to diagnosis the insertion of a slender aspirator needle into the loin at a point midway between the crest of the ilium and last rib, directing the point towards the abdominal aspect of the spinal column, and a little upwards. If there be a stone in the kidney the point of the needle will be felt to grate upon it, and some pus may be withdrawn in the aspirator. If the tumour be a new growth or tuberculous, Mr. Barker thinks that enough debris will come away in the needle to enable a judgment to be formed of the nature of the growth.

In the *Lancet* for April 17, Dr. THOMAS SAVAGE, of Birmingham, reports a successful case of nephrotomy for hydronephrosis in a woman aged 46. The ventral incision was made, and a wire clamp used. The patient recovered, with a sinus from which a tea- to a tablespoonful of clear fluid was discharged daily.

Sulphide of Calcium in the Treatment of Suppurating Buboes.

Dr. FESSENDEN N. OTIS, Clinical Prof. of Venereal Diseases in College of Physicians and Surgeons, New York, endorses (*New York Med. Journal*, May,

1880) the claim made by Sydney Ringer (see *Monthly Abstract of Medical Science*, 1874, p. 195) of the value of sulphide of calcium in arresting processes of suppuration, and he has for the last five years habitually prescribed it in cases of threatened suppuration in phlegmonous swellings from various causes, and, as a rule, with very gratifying results. He administers it in doses of $\frac{1}{12}$ grain every two hours, or $\frac{1}{20}$ grain every hour, during the day and up to the time of retiring. He has found these small doses useful in arresting the progress of furuncular swellings and abscesses, and in preventing their occurrence when threatened. On the other hand, he has repeatedly tested the influence of this drug upon the suppurative processes in mucous membranes, as in gonorrhœa, gleet, leucorrhœa, etc., without being able to discover that it influenced or modified the suppurative process in such cases in the least degree.

Among the cases in Dr. Otis's private practice, where prompt arrest of suppuration was quickly followed by absorption of pus already formed and resolution of the tumour, and apparently from the use of the sulphide of calcium, were several inguinal buboes associated with chancroid. The simple fact that resolution occurred in these cases was (in accordance with the popular teaching) accepted as proof that the buboes were of sympathetic and not of chancroidal origin.

Authorities have long taught that, once the virus from a chancroid has been carried along a lymphatic vessel and deposited in the adjacent lymphatic gland, inflammation is at once set up in the substance of the gland. This, it is claimed, goes steadily on in spite of all and any treatment until an abscess is formed. This must, sooner or later, through advance of the suppurative agency or by surgical interference, result in an open ulcer, the pus of which will possess the same vicious character as the chancroid from which it was derived. This variety of bubo is known as the virulent or chancroidal bubo. The suppuration of such buboes has been considered *inevitable*, and all buboes not pursuing this course have been set down as not of true chancroidal but of simple or sympathetic origin. Inflammatory lymphatic enlargements associated with chancroid are very naturally dreaded as most likely to prove by results to be of chancroidal origin, and usually, after a few feeble attempts at treatment with a view to their resolution, glands so affected are encouraged to suppurate, and prompt incision and evacuation of pus are advised as soon as the slightest true fluctuation is recognized. If suppuration is indeed inevitable, undoubtedly it is wise to encourage it, to evacuate the virulent product at the earliest moment, and thus afford access for efficient treatment for the destruction of this new-formed chancroid. For this reason Dr. Otis has been an earnest advocate for an early incision into suppurating buboes associated with chancroid. His experience in the few cases above alluded to, however, made him incline to the belief that a thorough and extended trial of the calcium sulphide in cases of inflammatory buboes associated with chancroid might give such results as to make its use imperative in every such case.

In order to gain further light on this important matter, a systematic use of the calcium sulphide was made, in his service at Charity Hospital, in eighteen consecutive cases of inflammatory bubo occurring with, or as the immediate sequel of, well-pronounced chancroid. All the facts considered of importance were noted by himself and under his direction by Dr. Johnson, his House Surgeon.

Out of eighteen cases of inflammatory bubo presenting the rational evidences of chancroidal origin, and treated systematically by the use of small doses of the sulphide of calcium, resolution occurred in fifteen, and in only three cases was incision ultimately required.

If we apply to these cases the usual rule that chancroidal buboes always eventuate in chancroidal abscesses, always suppurate and require evacuation by natural means or surgical procedure, then we must hold that only three out of fifteen cases of inflammatory buboes associated with chancroid were the result of transference of the suppurative process from the chancroid to the adjacent lymphatic gland. It is just possible, however, that the influence of the sulphide of calcium may, in arresting suppuration, extend to the true chancroidal bubo. The apparent successful use of this drug in the series of cases herewith presented at least suggests and invites a trial of its efficacy in all instances of threatened glandular suppuration, whether associated with chancroid or of purely sympathetic origin.

Salicylate of Lime in Syphilitic Ulcers.

Dr. RODRIGUEZ VIFORCOS (*El Siglo Medico*, March, 1880) gives two cases of syphilitic ulcer, in which the beneficial effects of salicylate of lime were very marked. The first case was one of soft sores, five in number, occupying the sutures between the prepuce and the gland. These were dressed several times a day with a two per cent. solution of the salicylate of lime. Within eight days the surface of the ulcerated patches was perfectly clean, the character of the inflammation had changed, and in three days more (eleventh of treatment) healthy granulations had everywhere appeared. The second case was one of phagedenic ulceration of the skin of the penis, extending from the middle to the base of the organ. The parts were very much swollen, and the destructive action was evidently spreading. The author refrained from cauterization, believing that such a procedure tends, if anything, to increase the probability of necrosis, but had recourse to carbolic acid, alcohol, tincture of iodine, and various other medicaments. None of these, however, giving satisfactory results, he tried the same solution of salicylate of lime as in the preceding case. The effects were remarkable: the pain at once became less, and cicatrization, hitherto so sluggish, now set in with healthy vigour. Within thirty days of commencing the application of the salicylate, the ulcerated surface was completely healed over.—*Lond. Med. Record*, May 15, 1880.

Removal of Effused Blood from Joints by Puncture.

The following questions, Prof. VOLKMANN points out (*Centralblatt für Chirurgie*, No. 10, 1880), are of considerable practical importance. Does the blood effused into an injured joint coagulate, or does it not? If it does coagulate, when and under what conditions does this coagulation take place? When and under what conditions is the blood absorbed? In a great number of cases of puncture of an injured joint, Volkmann always found the effused blood wholly, or almost wholly, fluid, when the trocar had been used in the course of the first three days. In one case on the sixth day, and in three cases after the eighth day, a considerable quantity of fluid blood, without any trace of clot, was drawn off. In most cases of puncture practised between the fourth and the eighth days, the great mass of the blood was found to be fluid, but was mixed with clots, some of which came away through the canula, whilst others remained within the joint. In one case of transverse fracture of the patella with wide separation of the fragments, and considerable distension of the synovial sac by blood, all the effused blood was found coagulated on the fifth day, so that not a drop could be withdrawn by aspiration, but only a few fragments of firm clots. The following case is quoted as being opposed to the view that coagulated blood within a joint, even when in considerable quantity, is rapidly absorbed. The patient was a man, aged forty, whose lower limb was amputated through the thigh, fourteen weeks after a compound and comminuted fracture of the tibia, associated with much contusion of the knee. The synovial sac of this articulation was found to be distended by a large mass of coagulated blood. The coagula were purely adherent to the inner surface of the capsule. The joint did not contain any synovial fluid. Puncture of an injured joint was first recommended by Prof. Volkmann in 1861, as a plan of treatment to be carried out in cases of fracture, extending into a joint where the adaptation of the fragments is prevented in consequence of the amount of effused blood. In a case of transverse fracture of the patella with much effusion into the knee-joint, three ounces of blood mixed with synovial fluid were drawn off by an aspirating syringe on the second day. The fragments of the patella were then brought together by strapping, and a gypsum bandage was applied. At the end of the eighth week there was union which, if not osseous, was at least so strongly fibrous that no movement of the fragments on each other could be made out. Since the introduction of the antiseptic method of treating wounds, Prof. Volkmann has practised puncturing in every case of traumatic hæmarthrosis of the knee. In 1873, in addition to the case already mentioned of transverse fracture of the patella, there were three cases of contusion of the knee with intra-articular effusion of blood, in which this plan of treatment was carried out. In cases of extensive traumatic effusion of blood within the knee, if no such treatment be followed, the blood-clot is often removed very slowly, and the injury is followed after a time by hydrarthrosis, stretching of ligaments, and other serious changes. According to recent experiences of Prof. Volkmann, rapid organization of the effused and coagulated blood may cause ankylosis and total obliteration of the injured joint. This, however, rarely occurs, the usual result of traumatic hæmarthrosis being the deposit on the lower surface of the synovial membrane of an uniform layer of firm clot, through which the secretion of synovial fluid is altogether suppressed. On the death of a patient, eleven months after a transverse fracture of the patella through direct violence, and long after the fragments had united, partly by bone, the knee-joint was found to be ankylosed, and the articular cartilages to be bound together and to the synovial membrane by a continuous layer of dense connective tissue, which prevented the least movement. This layer of connective tissue was of a rust-brown colour, and, as did also the synovial membrane, presented deposits of granular blood pigment.—*London Med. Record*, May 15, 1880.

Secondary Sutural Union of the Radial Nerve.

Professor VON LANGENBECK reports (*Berliner Klin. Wochenschrift*, *No.* 8, 1880), the following interesting case:—

The patient, a man of thirty-one, was injured in several places on September 5, 1879, by the fall of a ceiling in the house in which he was working. The right arm, which mainly interests us here, was bruised on the outer side, and there was some sloughing; an abscess formed and was opened, and a scar was left, corresponding exactly to the spot "where the radial nerve, after taking its course in an outward direction round the forearm, comes to the surface between the triceps and brachialis anticus muscles." At the same time a complete paralysis of the extensors of the hand and fingers, which dated from the time of the accident, persisted. The hand was pronated and hung loosely down. The fingers were slightly flexed and could not be extended, nor could the thumb be abducted. The corresponding muscles were unaffected either by the constant or induced current. The back of the hand and the arm were anæsthetic and somewhat œdematous. The diagnosis made was "breach of continuity in the right radial nerve as the result of the previous sloughing."

On November 25, 1879, an incision six centimetres long was made through the scar, and, after removing some very soft subcutaneous fat tissue, the divided ends of the radial nerve were found embedded in cicatricial tissue, about two centimetres apart, and *without* bulbous swelling. They were dissected out, a small portion carefully removed with the scissors from each, and then united by a catgut suture carried through them with a fine round needle about one millimetre from their extremities. The tension required to bring them together was very great, and made Professor Langenbeck fear an unsuccessful result. The wound was dressed antiseptically, and the arm put on an obtuse-angled splint. On December 9 the wound had healed. On December 14 the induced current caused distinct contraction of the extensors of the hand and fingers, and there was a slight power of voluntary movement. On December 20 the latter was well marked; and on January 14, 1880, under daily treatment with the induced current, the patient could extend his fingers completely, and raise the hand to a level with the forearm, but not further.

In his remarks on this interesting case, Professor Langenbeck observed that, owing partly to the great tension of the nerve-ends, and partly to the fact that no nerve-tissue could be found in the portions removed by the scissors, he had very little hope that continuity would be restored. Gluck, however ("Experimentelles sur Frage Nervennaht und der Nervenregeneration"—*Virchow's Archiv*, Bd. 78, 1878), has shown that the divided ends of a nerve unite by means of an intermediate substance consisting of granulation tissue in which spindle-cells develop and send out processes which unite the axis-cylinders of the nerve-ends together, and finally become converted into true nerve-fibrils. Probably some such intermediate substance was formed in Professor Langenbeck's case. The radial nerve has been sutured in two other cases: by Létiévant unsuccessfully, and by Esmarch (sixteen months after the injury) with almost perfect restoration of the functions and sensibility of the hand. On the whole, Professor Langenbeck does not consider the results of operation for nerve suture hitherto very successful. In all the published cases except the present there were severe pains in the course of the sutured nerves, and the wound did not heal by first intention, as here, or went through a long period of suppuration. Most of the former cases were sutured with silver wire or silk. Langenbeck strongly recommends catgut: it irritates less, can remain *in situ* permanently, and can be carried through the nerve-ends themselves. The absence of bulbous swelling in the divided nerve-ends has been already noticed. Professor Langenbeck explains this deviation from the rule in his case by the radial nerve having probably suffered a slow, and not a sudden, process of division during the sloughing of the bruised tissue of the arm. His case is further peculiar in the fact that the motor or centrifugal functions of the nerve were restored before the centripetal or sensory. The back of the hand remained anæsthetic when the extensor movements of the hand and fingers were completely restored.—*Med. Times and Gaz.*, May 29, 1880.

OPHTHALMOLOGY AND OTOLOGY.

Diabetic Hypermetropia.

The ocular complications of diabetes are well known, and diabetic cataract, retinal hemorrhages, optic neuritis, and paralysis both of the intrinsic and external muscles of the eye are often met with. Dr. LANDOLT contributes an article to *El Siglo Medico*, of Madrid, and calls attention to a symptom which has hitherto attracted but little attention. A woman, aged sixty-one, consulted him with reference to her sight. Long vision had always been good, and she had also seen well at a short distance with the aid of glasses, which, however, had now become insufficient. Upon examination he found that she had a hypermetropia of 1.25 dioptrics (= old No. 30), visual acuity 0.5, presbyopia 5 dioptries (old 8). With these glasses she saw well, so that the change of the sight depended upon a change in the refraction, rather than upon an alteration of the visual acuity. This change had occurred after a fall six months before, and in consequence of which she had suffered from pains in the back and hips, as well as from glycosuria. At the time of consultation there were 229.4 grammes of sugar in 2630 cubic centimetres of urine analyzed. The specific gravity was 1040. Fifteen days later the hypermetropia was only 0.75 dioptrics (old 50), and after four months 0.25 (old 156). At the end of five months it had entirely disappeared. The patient had become emmetropic, as before, and had returned to her old glasses. Coincidently with this increase of the refraction the quantity of sugar in the urine diminished, and when the hypermetropia had become 0.75 dioptrics it had disappeared altogether. The author attributes this diminution of refraction (hypermetropia) to the infiltration of sugar into the vitreous humor, in consequence of which the index of refraction is increased, whilst the general refraction of the eye is lessened.—*Lancet*, April 17, 1880.

A Case of Gonorrhœal Ophthalmia, with some novel suggestions as to Treatment.

Mr. George Critchett, Consulting Surgeon to the Royal London Ophthalmic Hospital, in a communication to the *Lancet* (April 3, 1880), says:—

As a general rule I have been unwilling to encumber medical literature with isolated cases, but I am disposed to think that exceptions may occasionally occur in which, either from extreme rarity or from the initiation of some new method of treatment, or, at any rate, a method very rarely employed and but little known, some fresh starting point may be established. Acting on this principle, and influenced by these motives, I am induced to bring the following case before the notice of the profession:—

Louisa C——, aged two and a half years, was brought to me at the Middlesex Hospital on the 15th of May, 1878. Her left eye presented all the appearances of acute gonorrhœal ophthalmia, and the collateral circumstances confirmed this diagnosis, as the child had a profuse yellow discharge from the vagina, with considerable swelling and irritation of the mucous canal. The lids were of a bright red colour and much swollen, and so densely infiltrated that even when the child was placed under the influence of an anæsthetic it was found impossible to separate them so as to ascertain the condition of the cornea. Yellow, and rather thick matter was exuding from between the lids.

Judging from past experience, seeing the extreme acuteness and severity of the symptoms, the difficulty in separating the lids or exposing the cornea, and the impossibility of getting any solution into contact with the conjunctival surface, I relinquished all hope of saving the sight. I have never in the course of my experience known such a condition eventuate otherwise than in the total destruction of the eye. Under these circumstances I determined to adopt a somewhat heroic and novel proceeding, and one that has not, I believe, been published. I passed a small silver director under the upper lid as far as the edge of the orbit, against which I kept it pressed; and then, with a small, sharp-pointed bistoury, I completely divided the lid perpendicularly as far as the margin of the eyebrow. In order more completely to uncover the cornea, I separated the two angles of the divided tarsus, and fixed them with fine sutures to the skin of the eyebrow. The cornea looked steamy, but not ulcerated, and was buried in chemosed conjunctiva. The immediate effect of this proceeding was to diminish the redness and swelling of the lids and conjunctival membrane and completely to expose the surface.

In the subsequent treatment of the case I was materially assisted by the house-surgeon, Mr. Dixon, who carried out my directions with great care, skill, and assiduity. A solution of nitrate of silver—thirty grains to one ounce—was painted over the entire surface of the conjunctiva three times daily, the eye was frequently cleansed and syringed with a solution of alum—ten grains to one ounce,—and a piece of linen moistened in the solution was kept constantly applied. This plan was continued, with gradual abatement of the symptoms, for a month; a weaker solution was then substituted, and at the end of six weeks from the commencement of the treatment the eye had recovered with a perfectly bright healthy cornea.

At the termination of another fortnight the child was again placed under the influence of an anæsthetic, when I pared the edges of the divided lids and brought them together with fine sutures. Good union occurred, the deformity is very slight, and the lid perfectly performs its function.

I may add that during the early part of the treatment the other eye was kept carefully closed with strapping so as to prevent any risk of inoculation.

To some it may seem that this rather novel proceeding was of too heroic and severe a character, but it at least had the merit of success. Every case of gonorrhœal ophthalmia, the result of direct contagion, that has come either under my care or my observation has been so uniformly attended with loss of the affected eye that I should certainly adopt a similar proceeding on any future occasion, and I beg to commend it to the attention of the profession. It seems to fulfil every indication: it relieves the immediate tension, and the strangulation with which the cornea is threatened; it permits the free escape of the matter, and enables the surgeon to make a thorough use of caustic and astringent remedies: while the slight subsequent scar on the lid is a small price to pay for a rescued eye.

Antiseptic Dressings in Ocular Surgery.

LUCAS-CHAMPIONNIÈRE (*Recueil d'Ophthalmologie*, April, 1880) sums up an essay on this subject by the following general conclusions. All antiseptic precautionary measures, apart from the immediate operation, such as cleansing of instruments, hands, etc., should be carried out by means of the stronger solutions of carbolic acid; but these are not suitable in operations upon the transparent parts of the eye. A strong solution of boracic acid is, however, generally well borne, as also pulverization, provided the spray apparatus be held at a sufficient distance. As a means of occlusion, the author prefers lint soaked in boracic acid in preference to carbolized gauze. Operations on the conjunctiva necessitate the same precautions, so far as concerns not irritating the eye by a strong antiseptic. If, however, the eye be destroyed, as in most of the cases which call for enucleation, or if the operation be a plastic one, carbolic acid is, perhaps, the most preferable disinfectant. The author, after enucleation, is accustomed to wash out the orbital cavity freely with a strong solution of the acid, and then to apply borated dressings over the lids, but nothing between them. For small wounds on the eyelids or ciliary margins, he advocates the use of borated ointment, spread on lint, the whole covered either with some impenetrable material, or with a layer of lint soaked in boracic acid, according as a moist or dry dressing is desired. On the whole, vaseline and boracic acid are the antiseptics of most use in ocular surgery.—*London Medical Record*, May 15, 1880.

MIDWIFERY AND GYNÆCOLOGY.

On the Treatment of Pelvic Suppuration by Abdominal Section and Drainage.

At a late meeting of the Royal Medical and Chirurgical Society (*British Med. Journal*, May 15, 1880), Mr. LAWSON TAIT advocated the principle of opening and draining the various conditions of suppuration classed as "pelvic abscess." He pointed out, and quoted Dr. West in support, that, in very many of these cases, the abscess opened into the rectum or other part of the intestine, into the bladder, or amongst the muscles of the anterior abdominal wall. When such openings were established, either death occurred or recovery was extremely protracted. Even when the abscess opened into the vagina or could be tapped from that canal, the recovery was frequently prolonged to an extent not commensurate with the size of the abscess. The author narrated six cases of pelvic origin, all of which seemed to have originated in extraperitoneal hæmatoceles. In none of them would vaginal tapping have been effectual in properly emptying the abscess of the *débris* of the clots. They were opened from above, the opening into the abscess-cavity being carefully stitched to the opening in the abdominal wall, save in one case where an already made adhesion rendered this part of the operation unnecessary. Wide glass drainage-tubes were then inserted, and were changed for smaller ones, and these again for wire or soft India-rubber tubes. The abscesses were closed, and the patients restored to health in about thirty days; they all made rapid and complete recoveries. Mr. Tait's general conclusion from these cases was, that the opening of such abscesses by abdominal section was neither difficult nor dangerous; that recovery was made in this way more certain and rapid than in any other. In future, he would always advise an exploratory incision in cases where he was satisfied there was an abscess, but where he could not reach it or empty it satisfactorily from below.

Mr. KNOWSLEY THORNTON said that the operation described by Mr. Tait was a great advance in surgery. Cases of pelvic suppuration had long been very unsatisfactory. He had treated two cases on the plan recommended by Mr. Tait. While many cases in which there was an opening through the vagina did badly, there was no doubt that some did well; but he thought that the abdominal section was to be preferred, especially if it were done antiseptically.

Mr. SPENCER WELLS thought that, in most cases, it was unnecessary to open the peritoneal cavity. The blood, pus, or serum could escape through an opening made through the vagina with a trocar; it should be kept free by means of a piece of wire, and an antiseptic solution, as of iodine or carbolic acid, should be injected. Mr. LAWSON TAIT said that Lister's method was followed in the first four cases, not in the others. The glass tubes used were those recommended by Kœberlé, varying in length from six to two inches, and from an inch to a quarter of an inch in diameter. No special antiseptic measures were used after the operations. In the sixth case, the patient had symptoms of septic poison before the operation; when the opening was made, these ceased, although no antiseptic was used. There was no intestinal adhesion in any of the cases, nor any difficulty about the action of the bowels. The incision was about the same length as in ovariotomy; the peritoneum was opened in five of the cases. There was no difficulty in stitching the wall of the abscess to the abdominal wall. Cases might be operated on through the vagina, but their progress was very tedious, and there was a probability of missing the abscess in tapping *per vaginam*. For the present, he would limit the abdominal operation to cases in which this probability existed.

Case of Extra-Uterine Gestation Treated by Abdominal Section.

At a late meeting of the Royal Medical and Chirurgical Society (*British Med. Journal*, May 15, 1880), Mr. LAWSON TAIT reported a third case which differed from the two previously read before the Society, in that the operation was performed before the death of the child, whose life was saved, but the mother succumbed to the operation.

Mrs. S., aged 33, had been married fourteen years and had had six children. Since her last menstruation, in May, 1879, she had been in constant pain, of which a severe attack occurred in July. In October she became satisfied she was pregnant; and Mr. Lattey, under whose care she was, suspecting the nature of the case, asked Mr. Tait to see her. A large abdominal swelling was evidently a pregnancy, and to the left of the umbilicus was a prominent mass, which, from its rhythmic contraction, was clearly the uterus, and was attached to the larger mass behind it. The head of the child was detected between the rectum and vagina. The pain becoming agonizing, and being unrelieved by opiates, an operation was determined on. Ether was administered on the morning of January 31st; and, on making the median incision, the empty uterus was found, and the cyst, which was the right broad ligament, was opened and the child removed without difficulty: the edges of the opening in the cyst were then secured to those of the parietal wound, leaving an opening for the discharge of the placenta, and the peritoneal cavity was closed. The child was at first profoundly narcotized, but was now, three months afterwards, thriving and well. The death of the mother, which occurred on the fourth day, seemed to be from protracted shock.

At the *post-mortem* examination, there were found some morbid appearances in the liver, and *ante-mortem* clots in the heart, but no peritonitis. The cyst proved to be the broad ligament, as diagnosed, and there was a deciduous lining in the uterus in process of separation. The Fallopian tube had been ruptured at its lower aspect, the ovum thus escaping into the tissue of the broad ligament: and the case confirmed the author's opinion that all extra-uterine pregnancies were originally tubal, that the tube burst between eight and twelve weeks, and where this did not produce death, an extra-uterine pregnancy was completed. The unfavourable result to the mother was due to the delay in the operation; but the case was of interest from the saving of the child. The child might have been removed by vaginal section, but the presence of large venous sinuses in every direction made it likely that any injury to one of them would be fatal; and in vaginal section it was impossible to see what to avoid.

Mr. SPENCER WELLS did not think it necessary to assume that rupture of the Fallopian tube occurred in all cases of extra-uterine pregnancy. An ovum might escape at the end of the tube and lodge anywhere. In a case of combined intra-uterine and extra-uterine pregnancy which he had examined, there was no rupture of the tube.

Dr. JOHN HARLEY suggested operation for the removal of the fœtus as soon as a correct diagnosis could be made. In a case under his care at St. Thomas's Hospital, a woman had a painful tumour in the side of the abdomen. He at first thought it to be malignant, especially as it increased in size. Soon, however, he found it to be an extra-uterine pregnancy. The woman was transferred to the obstetric wards, and was not operated on till pregnancy was far advanced. The children lived for two or three months, but the woman died.

Mr. TAIT said that the placenta had been left in the wound, as first recommended by Kœberlé. In such cases, it was gradually removed, and the wound healed from the bottom. The pathology of extra-uterine pregnancy was too extensive to discuss at present; but he had treated of the subject fully elsewhere.

and he adhered to his belief that in all the cases where examination had been made there was rupture of the Fallopian tube.

Case of Extra-Uterine Fœtation about the Seventh Month of Pregnancy; Sudden Urgent Symptoms; Removal of Fœtus by Abdominal Section; Death.

At a late meeting of the Obstetrical Society of London Dr. Braxton Hicks narrated the following case: The patient, aged twenty-nine, married ten years, had had two children, one seven years, the other four years since; no miscarriages. In April, 1879, she was taken with severe vomiting and abdominal pain, for which she was kept in bed a month. After getting up, she said that her womb came down. In July she was admitted into Guy's Hospital under Dr. Galabin, and then thought herself about six months pregnant. Only the fact of pregnancy, together with the swelling behind the cervix, was then made out, and she shortly left the hospital. In the first week of August she was re-admitted under the author, in the absence of his colleague. A tense enlargement then extended on the right side, three inches from the middle line, up as high as the umbilicus, whence it rose nearly to the left ribs, towards the flank, and extended downwards, filling the whole left hypogastric region. This evidently contained a living fœtus. A so-called "placental bruit" was heard over the centre of the abdomen, below the umbilicus. The cervix protruded through the vulva, the external os being patulous, so that the finger could reach the internal os, which was closed. The sound could not be carried into the uterus beyond the unimpregnated length. For greater assurance he had a sponge-tent introduced into the uterus, but nothing was found within but some fragments of decidua. At the end of a week she was suddenly taken with increased pain and distension of lower abdomen, shortly followed by collapse and pallor, pulse rising to 140, thready, temperature normal. She said that, while sitting by the side of the bed, she felt something give way in her lower abdomen, upon which the fœtus kicked violently, and then she became faint, and shortly after the movements ceased entirely. Three hours later the author found her in great distress from the tension, saw that evidently blood had been effused internally, and decided to operate, as the only chance for her life. This was done under carbolic spray, the incision being made in the median line, which had now become the most prominent part. A cavity was opened, containing a large quantity of dark, watery blood, which had evidently been effused within the placental area, and had been the cause of the symptoms. After its escape, the chorion was ruptured, and the lifeless fœtus, about the size of a large six months normal fœtus, extracted. Not much more blood flowed, and the wound was closed except an opening an inch and a half long. The patient, however, began to show signs of sinking, and died shortly after. At the *autopsy* it was found that the placenta extended up the abdominal wall in front almost to the umbilicus, and was not attached to uterus or bladder. The sac was adherent in all directions to intestines and other parts. Its lowest portion was attached in front of the uterus and behind the bladder. On the anterior surface of the uterus was a pedunculated fibroid as large as a walnut. The right Fallopian tube, firmly bound by adhesions, crossed the anterior surface of the uterus, and was attached to the lower surface of the fibroid, terminating in some loose tissue under the placenta. The right ovary was adherent to the right side of the amnial sac, and contained a large corpus luteum. The author remarked—(1) that the case was the analogue of concealed accidental hemorrhage in normal pregnancy; (2) that it was a clear case of true ventral pregnancy; and (3) he asked the opinion of the Society how the hemorrhage should be stopped if the operation were performed during active fœtal life, and the placenta found situated as in this instance. He thought that carbolized sutures might be kept within for a time, and a compress maintained, since rigid antiseptic treatment would be impossible.

Dr. WILTSHIRE thought that there was no doubt that abdominal pregnancy did occur, and instanced a case of Koeberle's in which, after ablation of an inverted uterus, pregnancy ensued by means of a fistulous opening at the top of the vagina: also one in which the roof of the vagina was ruptured by forcible coitus. He thought that, in the present case, as an exception to the general rule, it might have been preferable to remove the placenta.

Dr. ROUTH thought that, if the position of the placenta had been made out by auscultation, the incision might have been made away from the median line, and wounding the placenta avoided. He also asked why Dr. Hicks did not, in preference to performing gastrotomy at all, aspirate the sac, or kill the fœtus by injecting morphia into the amnial cavity. The separation of the placenta seemed to have been caused by the fœtal movements.

Dr. GERVIS mentioned a case in which he had performed primary gastrotomy for extra-uterine fœtation. Not much difficulty was met with, and but trifling hemorrhage, the position of the placenta being mostly in the pelvis; but the patient died in about three days, as the result of a continuous hemorrhagic loss through the drainage-tube. The autopsy showed no sign of peritonitis, but separation of the placental margins. Could any treatment diminish this danger?

Dr. PLAYFAIR was surprised to hear Dr. Hicks say that perfect antiseptic treatment was impossible, and thought that the chief hope of progress in such cases lay in carrying it out completely, however difficult that might be.

Dr. J. WILLIAMS thought that the insertion of a tent into the cervix was superfluous for diagnosis, and that it possibly had something to do with the sudden accession of severe symptoms.

Dr. EDIS called attention to the monograph of the late Dr. Parry of Philadelphia, who was led by his statistics to condemn the puncture of the cyst, and to recommend either removing the fœtus entire or allowing the cyst to remain uninjured.

Dr. BARNES was inclined to think that the present might be reckoned among a few exceptional cases in which removal of the placenta might be justifiable, the hemorrhage being afterwards stopped by compressing the abdominal walls together.

Dr. BRAXTON HICKS said that most of the speakers had mistaken the state of the case. Urgent symptoms suddenly came on while he was waiting for a short time to consider the best line of treatment. The tension was then so great as to obliterate the previous outline, but he did not think that the position of a *souffle* would always absolutely determine the site of the placenta. He differed from Dr. Routh, and regarded the violent saltation of the fœtus as evidence of its impending death from asphyxia. No great amount of recent blood was lost during the operation, but the question he had asked was: What should be the treatment if the placenta was cut, the fœtus being still alive? He could not agree with Dr. Barnes, that the placenta might be removed without too great risk of hemorrhage. In answer to Dr. Playfair, he thought that it would be extremely difficult to carry out the antiseptic treatment perfectly, though it might be possible under advantageous circumstances.—*Med. Times and Gaz.*, May 22, 1880.

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

Carbolic Acid Poisoning.

A sufficiently large number of cases have now been collected to establish beyond doubt the toxic influence which carbolic acid, used antiseptically, can at times exert. So long ago as 1875, Tardieu called attention to this important fact, and gave particulars of fifteen cases which up to that date had come under the notice of either himself or other observers. Since then the number of recorded cases has so largely increased that their consideration from a surgical point of view has become of the utmost importance.

Poisoning by carbolic acid applied externally may occur under two different forms. It may be sudden and without apparent cause, the patient sinking rapidly after the application of the dressings. KUSTER of Berlin has related five such cases, in one of which, however, recovery eventually took place. He opines that many so-called cases of death from shock or collapse after operations are really due to neither more nor less than poisoning from the carbolic acid employed. The second form is the more insidious and the more common, and therefore possesses greater interest for the surgeon. In it the symptoms show themselves only after a certain interval of time has elapsed. A patient after operation will perhaps steadily improve for some days or weeks. He will then become restless, his temperature will rise three or four degrees above normal, symptoms apparently of incipient septicæmia will develop themselves, and will in all probability be met by a more vigorous employment of antiseptic methods. The condition of the patient, however, becomes daily worse. Nausea, loss of appetite, giddiness, clonic spasms, great prostration, with coma, and even death, may close, and indeed have already too often closed, the scene. In many of these cases, there is no room for doubt as to the cause. It has been shown many times that, where recovery has taken place, the improvement in the symptoms has coincided in the most marked manner with the cessation of the use of carbolized dressings. On the other hand, it has been noticed that the symptoms have always become aggravated shortly after the dressings have been applied. The temperature has risen, and the patient has become more restless and uncomfortable, just at the very time when an opposite result might fairly have been looked for.

The most reliable symptom of carbolic acid poisoning, and one which is present in the vast majority of cases, is found in the condition of the urine. According to BAUMANN (*Pflüger's Archiv*, Band xiii.), we have in the reactions of this fluid a certain means of diagnosing not merely the fact, but the actual degree in which the intoxication is present. The urine often assumes a dusky hue, becoming almost black, and exhaling a peculiar odour, which is not, however, that of carbolic acid. The chemical tests are, however, more important and reliable than the physical appearances, which, indeed, may be at times absent. The most reliable test, and the one most readily applied, is that of Sonnenburg. It is founded on an estimation of the quantity of normal sulphates present in any given specimen. The sample of urine to be examined is first acidulated with strong acetic acid, and baric chloride is then added in excess. A copious precipitate, consisting mainly of baric sulphate, is at once formed if the urine be healthy. From the copiousness or otherwise of this precipitate, any albumen that may be present having first of all been separated, the degree of intoxication may be estimated. If acute or in an advanced stage, scarcely any precipitate will be deposited, the normal sulphates having undergone decomposition, and become soluble sulpho-carbolates.

As regards the treatment of carbolic acid poisoning, the first and most obvious step is to at once cease use of the acid. This in most cases will be sufficient to effect a cure, if the mischief have not advanced too far. It is, however, by no means necessary to leave off antiseptic treatment. It will be enough if some other disinfectant, such as salicylic acid or thymol, be substituted for the one hitherto used. Strongly oxidizing agents, such as potassic permanganate and calcic chlorate, would probably lessen the activity of the poison, but as a rule they are inadmissible as antidotes, from the effect they themselves exert on the mucous membrane of the stomach. The latest researches of Baumann in this direction give, however, some valuable results. He has succeeded in showing that sodic sulphate forms with carbolic acid, within the body, soluble and innocuous sulpho-carbolates. Hence Glauber's salt, or other soluble sulphate, would appear to be the direct chemical antidote to carbolic acid present by absorption or otherwise in the blood or tissues.

In the present state of knowledge on the subject, little more can be recommended than increased care in the use of what is undoubtedly a valuable and active medicament. It need scarcely be remarked that the chief danger of absorption exists in the case of large cavities, such as those remaining after the evacuation of ulcers, or where disinfectants have been injected into the larger joints, the pleura, or the uterus. It is probable that strong solutions of carbolic acid are less dangerous than weak ones, for, by coagulating at once the albumen of the tissues, they render further absorption impossible. Children and feeble persons are more susceptible to the toxic effects of the acid than those of a more robust type. The main point is to watch every case carefully, and on the slightest sign of any rise in temperature, or any increased restlessness and discomfort after the applications of the dressings, to have recourse to the barium test. It should not be forgotten that the mere quantity of acid used affords no criterion as to its probable effects. These will vary in each case with the age, the state of health, and the idiosyncrasy of each individual.—*London Med. Record*, May 15, 1880.

On the Toxic Action of Salicylate of Soda.

This subject, though manifestly of extreme importance, has attracted comparatively little attention in England. On the Continent, however, several observers have lately recorded well-marked and unmistakable cases of subacute poisoning by salicylate of soda. Thus, in a record of 250 cases, CATTI (*Gazetta degli Ospitali*, Feb. 29, 1880) witnessed unpleasant and even alarming symptoms in four. In one, the drug administered in doses of twelve grains every four hours, during a period of ten hours, caused drowsiness, deafness, and complete amaurosis; in another, subacute delirium; in a third, severe gastralgia; and in a fourth, well-marked dyspnœa. PETERSEN (*Deut. Med. Woch.*, Nos. 2, 3, 1877) mentions a case in which twenty-two grammes, administered in the space of six hours, induced disturbances both of respiration and circulation. But GUBLER (*Journal de Pharmacie*, June, 1879) goes further than either of these observers in his estimate of the toxic properties of both salicylic acid and its soda salt. According to him, they at times produce effects not inferior to those of an irritant poison. Among such he enumerates severe colic, copious diarrhœa, cyanosis, and collapse, with eventually ulceration of portions of the digestive tract. On the other hand, a long array of names may be quoted in support of conclusions diametrically opposed to those of Petersen and Gubler. In this case, however, negative evidence is of comparatively little importance. The question at issue is not the possibility, but rather the frequency, or otherwise of salicylic intoxication. Of the fact of such having occurred, there is unfortunately no room for doubt; both clinical observation and physiological experiments having thoroughly established it.

CHIRONE and PETRUCCI (*Commentario Clinico di Pisa*, January and February, 1878) have demonstrated that salicylate of soda administered to animals first increases and then diminishes the frequency of the respirations, while Buss and Kœler have shown that dogs and rabbits poisoned by it have died with the symptoms and *post-mortem* signs of asphyxia. Considering the very extensive use of salicylate of soda as a therapeutic agent, it is important to have some ready means of watching its action on the system. Administered in medicinal doses, it can generally be readily detected in the urine within two hours of its ingestion. The best and most sensitive test of its presence is a few drops of perchloride of iron added to the urine in a test-tube. If salicylic acid be present, a bright violet colour, due to the formation of salicyluric acid, will at once be struck. This reaction is extremely delicate, and may be relied on if one part in a million of the acid exists in the sample of urine. It being known that almost if not all the acid ingested is eliminated by the kidneys, its presence will be a more or less satisfactory proof that these organs are physiologically sound. Should it not appear, however, it is evidently either accumulating in the system, or is undergoing some abnormal decomposition by which its chemical characteristics are being essentially altered. Seeing, therefore, that the toxic effects of salicylate of soda may manifest themselves at any moment, and in any case, some general rules as regards its administration seem to be called for. Judging from their known physiological action, all salicylates should be given with considerable caution in cases either of phthisis or of renal disease. Their employment should at once be stopped, or at least very carefully watched, whenever the characteristic appearances in the urine cannot readily be detected within two hours after ingestion of the medicine. The possibility of idiosyncrasy in certain individuals should always be borne in mind. together with the fact that salicylic acid itself is not infrequently adulterated with carbolic acid. The importance of this latter fact is self-evident. After all, however, very little is as yet accurately known as regards the indications either for or against the use of salicylic acid and its salts. In such circumstances, therefore, the practitioner can do little more than study carefully and intelligently each case on its own merits, bearing in mind that, so far as at present observed, all untoward symptoms have quickly passed off, without having left any permanent ill effects.—*London Med. Record*, May 15, 1880.

Inhalations of Oxygen in Poisoning by Laudanum.

At a late meeting of the Société de Thérapeutique (*Bull. Gén. de Thérapeutique*, Feb. 15, 1880), M. CREQUY reported that he had used with success, in a case of poisoning by laudanum, inhalations of oxygen. The case was a child of four months attacked with diarrhœa. It had been given by mistake a coffee-spoonful of a laudanum potion, after the absorption of which the child fell into a state of deep narcotism; death seemed to be imminent, when M. Crequy resorted to the use of inhalations of oxygen; improvement was rapid, but it seemed to cease as soon as the inhalations were abandoned. The cure was complete at the end of twenty-four hours.

He adds to this case one he observed three years ago. A woman, asphyxiated by coal-gas, was cured by the same treatment, but he adds that this treatment should be prolonged beyond the apparent cure, otherwise the patient would be exposed to the return of toxic symptoms.

M. LIMOUSIN recalls the fact that M. Constantin Paul, twelve years ago, reported a case like the one M Crequy has just described; it occurred in a woman poisoned by extract of opium.

JEFFERSON MEDICAL COLLEGE,

PHILADELPHIA.

THE Fifty-sixth Session of the Jefferson Medical College will begin on Monday, October 4th, 1880, and will continue until the first of March, 1881. Preliminary Lectures will be held from Monday, 6th of September.

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CLINICAL INSTRUCTION is given *daily* at the HOSPITAL OF THE JEFFERSON MEDICAL COLLEGE throughout the year by Members of the Faculty, and by the Hospital Staff, which is constituted as follows:—

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Pathologist.

MORRIS LONGSTRETH, M.D.

A SUMMER COURSE of Lectures is given, beginning on the fourth Monday in March, 1881, and extending through the months of April and May, and to the middle of June. There is no additional charge for this Course to matriculates of the College, except a registration fee of five dollars; non-matriculates pay forty dollars, thirty-five of which, however, are credited on the amount of fees paid for the ensuing Winter Course.

FEES.

Matriculation Fee (paid once)	$5 00	Practical Anatomy	$10 00
Ticket of each Professor (7) $20	140 00	Graduation Fee	30 00

The Annual Announcement, giving full particulars, will be sent on application to

ELLERSLIE WALLACE, Dean.

Graduates who may see this notice will confer a great favor by sending to the Dean a postal card with the correct names and residences of themselves, and of other graduates in their vicinity, to whom announcements may be sent.

ALUMNI PRIZE OF FIVE HUNDRED DOLLARS.

The Cartwright Prize of the Alumni Association of the College of Physicians and Surgeons, New York, which amounts to $500, will be awarded, subject to the following conditions, to the best essay on some subject in medicine or surgery:—

1. The prize is open to the competition only of Alumni of the College.
2. The subject is left to the option of the contributor.
3. The essay must present sufficient original experimental or clinical observation to make it a useful contribution to medical knowledge.
4. The essay, designated by a motto, must be sent to a member of the Committee on Prize Essays, accompanied by a sealed envelope inscribed with the motto, and containing the name and address of the author, on or before February 1st, 1881.

Committee { A. H. BUCK, M.D., 52 East 31st Street.
J. E. JANVRIN, M.D., 120 Madison Avenue.
W. T. BULL, M.D., 33 West 33d Street.

The Alumni Prize, also amounting to $500, will be awarded in 1882, subject to the same conditions.

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FOR OCTOBER 1880.

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FOR OCTOBER 1880.

ARTICLE I.

CONGENITAL SYPHILIS OF THE THROAT; BASED UPON THE STUDY OF ONE HUNDRED AND FIFTY CASES.

By JOHN N. MACKENZIE, M.D., of Baltimore, Maryland. Late House Physician in Bellevue Hospital, N. Y., and Chef de Clinique at the London Hospital for Diseases of the Throat, Golden Square, W.

ISOLATED cases of laryngeal lesions in congenital syphilis are to be found scattered here and there through medical periodicals; but systematic writers have either entirely ignored the subject, or referred to a few recorded cases as pathological curiosities. The universal sentiment of authority is decidedly adverse to the frequent implication of the larynx, and the changes in the voice are referred to the intervention of fortuitous catarrh.

From a careful investigation of the subject, which has served only to strengthen conviction, I believe: *that laryngeal disease is not rare in congenital syphilis; that it is one of the most constant and characteristic of its pathological phenomena; and that we may look for invasion of the larynx with as much confidence in the congenital, as in the acquired form of the disease.*

Through the courteous invitation of the President, Mr. Hutchinson, I was enabled to express this view, April 6th, 1880, at the Pathological Society of London.

We occupy to-day the same position that we did not many years ago, in regard to the laryngeal manifestations of acquired syphilis; and, indeed, we may find the historical parallel of this question in the development of our knowledge in almost every other department of laryngeal pathology.

Formerly laryngeal disease in constitutional syphilis was regarded as a pathological curiosity, and it is only within a comparatively recent period that our views upon this subject have undergone a radical change. Distinguished authority[1] affirms that "the majority of cases of chronic laryngitis which we meet with are syphilitic."

I believe that laryngeal lesions have not been found more frequently, simply because they have not been sought. This arises, first, from the acknowledged difficulty of laryngoscopic examination in children; secondly, from the fact that the laryngoscope is still in the hands of the few; thirdly, and mainly, from imperfect post-mortem investigation.

Systematic examination of the larynx during life would greatly facilitate the future study of the disease. Although beset with difficulties, they are not insurmountable, and may often be overcome by a little tact and patience. I have been enabled to make a satisfactory laryngoscopic diagnosis in a child eight months old, and Schrötter[2] has succeeded in an infant two months younger.

Cases have been met with in which aphonia has existed, and yet nothing discovered to account for it at the autopsy. But we must remember that the post-mortem appearances of the larynx, especially as regards its vascularity, are often different from those observed during life; a truth which finds its explanation mainly in the histology of the laryngeal membrane. It sometimes happens in those who have died of laryngeal œdema to find no trace of that condition at the necropsy, and this fact has led some to overlook the frequency of the complication as the immediate cause of death in renal disease. We should therefore hesitate to accept the negative evidence of post-mortem examination as an absolute proof of the absence of lesions during life. On the other hand, the absence of symptoms referable to the larynx should not justify neglect in its examination after death. Every throat specialist must know to what extent this organ may be involved, without decided impairment of function. Cases are not wanting in which extensive disease exists, without dyspnœa, change in the voice, or other symptoms of laryngeal disorder. The greater number of patients consult the general practitioner and surgeon, and comparatively few come under the observation of the laryngoscopist; and hence in the works of the latter we find but trivial allusion to the subject.

In judging of the absolute frequency of these lesions, we should bear in mind the great mortality of congenital syphilis, the vast majority dying at an early stage, before pronounced laryngeal changes can develop. This, together with the prophylactic effect of treatment, tends to lead us into error.

If the aggregate number of cases of constitutional syphilis be taken, the proportion in which deep laryngeal ulceration exists is comparatively small. Hence we should expect a relative infrequency of malignant laryngeal inflammation in the congenital form of the disease.

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[1] Wilks and Moxon, Pathological Anatomy, Lond. 1875, p. 301.

[2] Monatsch. für Ohrenheilkunde, 1879, No. 11.

There is every reason to believe that these inflammations have been confounded with simple and fibrinous laryngitis and their dependence on syphilis overlooked. There are some who maintain that the laryngitis of congenital syphilis is nothing but a simple, fortuitous catarrh. Upon this hypothesis, it will be difficult to explain the constancy of the condition, and its control by mercury after other means have failed.

That the larynx should be frequently attacked, follows, *à priori*, from its known susceptibility to invasion in childhood, during the course of those diseases which are analogically allied to syphilis. On anatomical and physiological grounds, too, and in view of its connection with the pharynx which is so often the seat of inflammation, we should look for its frequent implication. Given, then, an organ with known proclivities to infection, anatomically and physiologically predisposed to disease, and nourished by a vitiated blood; and given a more or less complete abrogation of nasal respiration, and the inhalation, therefore, of an atmosphere cold, dry, and charged with impurities, and we have all the conditions necessary to initiate inflammation and awaken the events of syphilis.

The aim of this paper is to invite attention to the throat as a frequent seat of the lesions of congenital syphilis. The following description of the mode of occurrence, natural history, and characters of the disease, is the outcome of an analytical study of 150 cases of throat syphilis of congenital origin. This collection is made up of patients coming under personal observation in the Throat and Children's Hospitals of London, together with examples and morbid specimens which I have been enabled to examine through the kind invitation of medical friends. To these has been added all cases available to me in the scattered literature of the subject.

LESIONS OF THE PHARYNX. *Superficial Pharyngitis.*—The fauces, velum, and posterior pharyngeal wall, present simply an erythematous efflorescence, or are the seat of lardaceous infiltration. The posterior wall is often covered with muco-pus from the nose and nasopharynx, upon the removal of which, it offers a deeply injected, glazed appearance. Enlargement of its follicles is sometimes observed. I have seen follicular inflammation which seemed to depend upon a syphilitic cause. The follicles stood out prominently from the wall of the pharynx, were greatly swollen, and filled with a yellowish secretion, and their circumference was surrounded by a well-defined inflammatory areola. They varied greatly in size, the largest having about the diameter of a mustard seed. The condition disappeared in two weeks under "mixed treatment." Bärensprung[1] relates a case where they appeared as white knobs of variable dimensions projecting from the posterior wall. Although mucous patches are frequently found on the uvula, tonsils, and faucial pillars, the posterior pharyngeal wall is singularly exempt, and Trousseau[1] states that they are never found in this part of the pharynx. Fournier[2] has seen an ulcerated tubercle of the posterior part of the pharynx, and Homolle[3] reports a case of congenital syphilis in which the back of the throat was red, granular, and inflamed, and presented a large prominent papule of a rosy color. The patches in the fauces resemble those found in the adult in physical characters and tendency to relapse; but they are rarely symmetrical, and seem to have a greater tendency to ulceration, the resulting ulcers sometimes being almost identical in appearance with the tertiary destruction of acquired disease.

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[1] Die Hereditäre Syphilis. Berlin. 1864. S. 130. Cases of inflammation and ulceration of the larynx are referred to by this author.

Hypertrophy of the tonsils is present in a large proportion of cases. It is simple in character, or the glands may be the seat of lardaceous infiltration. In the latter case, they have a square outline, and a uniform, smooth, waxy appearance, in which it is difficult to recognize the mouths of the follicles and lacunæ. They are often adherent to, or fused with, the pillars of the fauces. In the case of follicular pharyngitis referred to above, they were the seat of a like condition, which disappeared with the pharyngeal affection.

Warty growths are found in the pharynx, which resemble those met with in the larynx, and which depend upon chronic vascular congestion, or may follow the cicatrization of ulcers. They are said[4] to be of not uncommon occurrence, and to be found "chiefly on the hard palate and back of the tongue, and at that stage when keratitis occurs. They are usually multiple, large, and sessile." Hüttenbrunner[5] found them at the base of the tongue, and Bryant[6] describes a warty growth upon the tongue of an infant six months old, the subject of congenital syphilis.

A case of sarcoma of the pharynx and upper jaw simulating nasopharyngeal polypus is recorded by Mr. Spencer Watson;[7] but its dependence on congenital syphilis does not follow from the account given by the author.

With deep ulceration of the pharynx stomatitis is commonly associated. The gums, palate, and buccal surfaces are thickened, infiltrated, and present a characteristic albuminous appearance. On this pale ground ramify arborescent, wine-coloured vessels, and here and there small hemorrhages are seen beneath the mucous membrane. There is often a scarlet line along the gums at the insertion of the teeth, which stands out in striking contrast to the surrounding pallor of the parts. This is most likely determined by the carious condition of the teeth, and may be analogous to the inflammatory zone which surrounds other syphilitic lesions.

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[1] Clinique Médicale de l'Hôtel Dieu, tome iii. p. 300.

[2] De la Contagion Syphilitique. Paris, 1860, p. 11.

[3] Des Scrofulides Graves, etc. Thèse de Paris, 1875, p. 116.

[4] Brit. and For. Med.-Chir. Rev., 1875, vol. ii. p. 29.

[5] Jahrbuch für Kinderheilkunde. N. F. Bd. v., 1872, xx. p. 338.

[6] Surgical Diseases of Childhood. Letts. Lect., 1863, p. 83.

[7] Med. Times and Gazette, 1875, vol. ii. p. 388.

Dr. Morell Mackenzie has called my attention to the absence of the characteristic notching of the teeth in those in whom the throat is affected. Out of seven cases examined with reference to this point, there were three in which this condition was not present. In one of these, there was a deficiency in the left central upper incisor, giving it a more or less V-shaped appearance, and in another, a roughening of the lateral edge of the lower central incisor of the right side. In the third, the teeth were apparently sound.

Deep Destructive Ulceration.—It is generally laid down in the text-books that deep ulceration of the mouth and pharynx in congenital syphilis is very rare, and Mr. Holmes[1] goes so far as to say that the affection of the palate, so common in syphilis of the adult, is "so rare in children that it is doubtful whether the few cases which occur in infants during syphilis may not be mere coincidences." A great deal of obscurity prevails concerning these palato-pharyngeal ulcerations in consequence of a persistent adherence to the old superstition that refers them indiscriminately to scrofula. Its aid has been invoked to explain these lesions of the throat, and much valuable time has been expended in the attempt to establish their alleged correlation. It is hard to free the mind from the trammels of traditional error, and authors are too prone to find in struma the *ultima thule* of their investigation. But an advanced pathology is teaching a different lesson, and has begun to alienate from the embrace of scrofula many of its so-called characteristic phenomena, and to assign them to definite, tangible causes.

The doctrine that ascribes them to struma, promulgated in 1844 by Hamilton,[2] has found, especially during the past fifteen years, some stout advocates in France. Monographs and essays have emanated from the French school, supporting their scrofulous origin, and "L'Angine Scrofuleuse de la Gorge" is the popular theme for the graduation thesis. But an examination of the subject shows that syphilis, tuberculosis, and lupus are ascribed indiscriminately to scrofula. Apart from these diseases, which are distinct from struma, there is no reason to believe in an ulcerative scrofulide of the throat. The identity of that form of ulceration, which is neither tubercular nor the result of lupus, with syphilis, follows from the negative evidence of their duality, and the positive fact of their pathological unity. The transmission of syphilis as scrofula is the unscientific and illogical refuge that is sought to avoid the specific nature of lesions which present all the features of syphilis, and in which no reflex of scrofula is found.

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[1] Surgical Treatment of the Diseases of Children. Lond. 1868, p. 350.

[2] Dublin Journ. of Med. Sci., vol. xxvi. p. 282 et seq.

Excluding, therefore, lupus, tuberculosis, and other rare forms of ulceration not necessary to discuss here, deep palato-pharyngeal destruction in children is nearly always the result of syphilis. It is impossible to exaggerate the part allocated to congenital syphilis in the evolution of these lesions; and we may say with Van Buren and Keyes,[1] that "such a condition of the throat is always the result of syphilis, never of scrofula, or so rarely that the word never is allowable."

This question, however, is not one of purely pathological interest; it involves imperative obligations in the treatment of these ulcerations for which the surgeon will be held responsible. Under a misconception of its true nature, syphilis, uncontrolled, will lead to destruction and deformity, and influence for evil the future happiness and usefulness of the individual.

Deep ulceration may invade the bucco-pharyngeal cavities at any period of life from the first week up to the age of puberty, those cases occurring at the latter period, and afterwards, being generally forms of tardy development. Out of 30 cases analyzed with reference to the period of invasion, 14 occurred within the first year, a proportion of nearly one-half, and of these, 10 within the first six months. Whitehead[2] has observed putrid ulceration of the throat in an infant three days old. Of the remaining cases, the majority occurred at a period more or less advanced towards puberty. It is an accepted fact that syphilis may lie in a state of potential activity within the system for many years after birth. Lying thus quiescent, it seems to await the advent of some physiological epoch to call its phenomena into activity. Thus puberty, and its surrounding years is often selected as the chosen period of its outbreak. It would be interesting to pursue this subject further, and trace the possible influence of the menopause in the evolution of these tardy forms of syphilis. When the eruption of the disease is thus delayed, it is on the palate, and in the pharynx, that it most frequently makes its appearance, and deep palato-pharyngeal ulceration often first attracts attention to the existence of a diathesis of which it is the sole pathological expression. Lesions of these structures are found with a peculiar constancy, and upon them syphilis apparently concentrates all its energy and exhibits most of its virulence.

Gross[3] has called attention to the deep ulcerations of the throat, palate, and nose in those exceptional cases of congenital syphilis where life is prolonged until after puberty; and Atkinson[4] has laid stress upon the tendency of tardy syphilis to attack the pharynx and fauces, the bones of the hard palate and nasal cavity and contiguous parts.

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[1] Dis. of the Genito-Urinary Organs and Syphilis, 1874, p. 599.

[2] On the Transmission from Parents to Offspring of some Forms of Disease. Lond. 1851, p. 137.

[3] System of Surgery, 1872, vol. i. p. 345.

[4] American Journ. Med. Sci., vol. lxxvii., 1879, p. 71.

Sex.—Females are attacked more frequently than males in the majority of instances. Out of 69 cases of pharyngeal ulceration, 41 occurred in females.

That these cavities should be frequently attacked, is easily understood, if we reflect upon their great vascularity, and the necessary irritation to which they are constantly subjected.

Ulceration may occur in any situation, but its favourite seat is the *palate* and especially the hard palate, for which it manifests the closest elective affinity. When ulceration occurs at the posterior part of the hard palate, the tendency is to involve the soft palate and velum, and thence to invade the nasopharynx and posterior nares. Seated anteriorly, it seeks a more direct pathway to the nose which is established by perforation of the bone.

Simultaneous or consecutive ulceration of the palate, pharynx, and nose seems to be characteristic of syphilis.

The next most common seats of ulceration, in their order of frequency, are: the fauces, the nasopharynx, the posterior pharyngeal wall, the nasal fossæ and septum nasi, the tongue and gums. Zeissl[1] states that he has never seen ulceration of the nasopharynx and posterior pharyngeal wall, whilst according to Dron,[2] Horand,[3] Chaboux,[4] and Mauriac,[5] the nasopharynx is its most frequent seat; and Bumstead[6] regards the posterior pharyngeal wall as a favourite seat of the gummy tumour. I have met with ulceration of the nasopharynx twice, and have lately seen a boy, with Dr. Whistler, in whom this cavity was practically obliterated by cicatricial bridles, precluding respiration through the nose. The adhesions were successfully divided with a galvano-cautery knife devised by Dr. W., and the obstruction to nasal respiration completely removed. Ulceration of the posterior pharyngeal wall is not uncommon. It was present in two cases under my observation, and in four adhesion had taken place between the pharynx and posterior pillars of the fauces. Similar examples have been recorded by others, which will be alluded to later on.

A peculiarity of these ulcerations, and especially those of the palate, is their *centrality of position.* They are generally found in the median line of the vault, at the junction of the palatal processes of the superior maxillæ, and the area of destruction on either side is equal and symmetrical.

Often more acute in their development, and advancing with more rapid strides than in the tertiary syphilis of the adult, *the special tendency of these ulcerations is to attack the bone and eventuate in caries and necrosis.* Disorganization of the bone occurs in over three-fifths of recorded cases. The great vascularity of the periosteum and medullary membrane in youth doubtless invites invasion of the osseous structure. This, however, is contrary to the experience of Colles,[1] who has never seen a case, West,[2] who has only seen necrosis once, Holmes,[3] who has seen sloughing of the soft palate, but not excavated ulcers of the tonsils or caries of the hard palate, and Cooper Forster,[4] who has never met with an example in which syphilis had advanced to disease of the bone.

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[1] Lehrbuch der Syphilis. Bd. II., 1875, S. 323.

[2] Bull. de la Soc. Nat. de Méd. de Lyon., 26 juin, 1876.

[3] Ibid.

[4] De Certaines Lésions de la région Nasopharyngienne, etc. Thèse de Paris, 1875, p. 43.

[5] De la Syphilose Pharyngo-Nasale. Paris, 1877, 6me leçon, p. 54.

[6] Pathology and Treat. of Ven. Dis. Phila. 1879, p. 753.

This tendency to necrosis exists at all periods of life ; but especially in early youth, at which period it is more destructive and less amenable to treatment. When these ulcers are situated upon the hard and soft palate, *perforation* of these structures follows in very nearly one-third of the cases. Thomas Williams[5] has attempted, though unsuccessfully, to draw a distinction between what he calls "Perforating Ulcer of the Throat," and the tertiary perforation of syphilis ; and Homolle[6] has described the same condition under the title of "Echancrure Marginale, et Ulcère Pérforant," which he attributes to a scrofulous cause.

As a rule, these ulcerations originate upon the palate or within the pharynx ; but they are occasionally consecutive to deep, ulcerating syphilides of the nose and face. Whatever their point of departure, the palate is usually the structure upon which the destructive process ultimately descends.

Thus we have seen that the palate, pharynx, and nose constitute a well-defined pathological territory, singularly obnoxious to these ulcerative products, and within whose confines we may best study the development and growth of these degenerate forms of syphilis.

Ulceration of the tongue occurs in a certain proportion of subjects. I have seen three cases. In the first the ulcer was situated on the right side of the tongue near its tip ; in the second, in the left glosso-epiglottic fossa ; and the third followed the breaking down of a large gumma on the upper surface of the organ near its base.

Holmes[7] describes and figures a large ulcer of the tongue, with grayish floor and hard elevated edges, which followed ulceration of the fauces, and which healed rapidly under potassium iodide. Cicatrices of old ulceration have been observed by Casati.[8] In the three cases referred to there was laryngeal and pharyngeal ulceration.

The ravages of the disease present the typical appearances that are found in the tertiary syphilis of the adult. Accordingly we find the ulcers of a more or less circular or oval form, with a deep base of grayish or lardaceous appearance, with elevated, well-defined, and often bloodshot walls, surrounded by a deep zone of inflammation, and covered with a foul, dirty, yellowish secretion, which imparts to the breath the peculiar odour of syphilitic pharyngeal ulceration, which, according to Van Buren and Keyes,[1] "is itself suggestive if not pathognomonic."

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[1] Ven. Dis., Lond. 1837, p. 271.

[2] Lect. on Dis. of Child., p. 747.

[3] Surgical Treatment of Diseases of Children. Lond. 1868, p. 351.

[4] Surgical Diseases of Children. Lond. 1860, p. 291.

[5] Brit. Med. Journ., 1862, vol. ii. p. 66.

[6] Op. cit.

[7] Op. cit., pp. 357–358.

[8] Annales de Dermatologie et de Syphiligraphie, tome iv., 1872–73, p. 218 et seq.

The appearance of the ulcer will vary to a certain extent with the general condition of the patient. In a badly-nourished, cachectic child the granulations may assume a pale, unhealthy, and indolent look, and the red corona may fade into a purplish ring, or even be entirely wanting. But in all there is a strict adherence to the true syphilitic type; in all we can recognize the portraiture of syphilis.

Following cicatrization, adhesion of the velum to the pillars of the fauces, adhesion of the latter to the pharyngeal wall, stenosis and obliteration of the pharynx and nasopharynx; in fine, all the sequelæ are found which follow constitutional syphilitic ulceration in these localities.

Œsophagus.—Although the constant irritation to which the œsophagus is subjected by the gravitation of purulent secretion from the nose, and its carriage thither by the movement of deglutition, determines a condition of chronic congestion and hypersecretion of its follicles, well pronounced lesions of this organ are very rare. Nature seems to afford a certain amount of conservative protection which guards it against the more destructive forms of syphilis. This is interesting, in view of the fact pointed out by Billard,[2] that the œsophagus in young children is the seat of an habitual congestion, more or less considerable, and hence a tendency exists to inflammation and disorganization.

Extreme pallor, associated with minute ecchymosis, is sometimes observed. Köbner[3] found the lower third of the organ the seat of softening and cadaveric discoloration.

The popular idea that mucous patches descend into the œsophagus from the pharynx appears to have little foundation in fact, and the improbability of such an occurrence is rendered more impressive when we reflect that these patches are very rarely observed in the lower part of the pharynx, and never on the posterior wall. Billard[4] describes a case of œsophageal ulceration of uncertain origin, but which was probably syphilitic.

The subject was a little girl, æt. 6 days, who had a stifled cry, and who died of exhaustion. The post-mortem showed cicatrization at the base of the tongue, redness of the pharynx, tumefaction and redness of the glottis, with mucosities in the ventricles, streaked congestion of the trachea and bronchi, and hepatization of the right lung. The superior portion of the œsophagus was deeply injected, and presented a longitudinal ulcer six lines long by four in breadth, with a yellowish base, and thick, red, bloody borders. In its centre the mucous membrane was destroyed, and the cellular membrane exposed.

Reimer[5] has placed on record a most interesting example of congenital syphilis, in which there was perforation of the œsophagus.

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[1] Op. cit., p. 599.

[2] Traité des Mal. des Enf. Nouveaux-nés à la mamelle, 1833, p. 304.

[3] Klinische und Experimentelle Mittheilungen. Erlangen, 1864, p. 126.

[4] Op. cit., p. 307, Obs. 24.

[5] Jahrbuch für Kinderheilkunde, Bd. x. 1876, 98.

It occurred in a boy of 12, in whom there was redness and swelling of the tonsils, an indolent ulcer at the junction of the hard and soft palates, penetrating to the perichondrium, and another with lardaceous bottom and swollen, reddened edges on the under surface of the right turbinated bone. In the middle of the neck was also an ulcer, surrounded by lardaceous infiltration and enlarged glands, from which there issued a constant dirty and sanious discharge. There were gummy deposits in the surrounding muscles. This ulcer was found, on post-mortem examination, to communicate with the œsophagus in the vicinity of the cricoid cartilage by a sinuous callous tract. The œsophageal opening presented an elevated, everted edge, and the mucous membrane in its neighbourhood was reddened and swollen, and the seat of very large grayish granulations. Further on the membrane became paler. There was no dysphagia, but great emaciation during life.

LESIONS OF THE LARYNX.—The laryngeal lesions of congenital syphilis are constant and characteristic, and play an important rôle in the pathological evolution of the disease. Often amongst the first events of its clinical history, they may rapidly terminate in death, or stealthily advance, inaugurating progressive morbid changes, which, at first temporarily controllable, ultimately become inveterate. And thus the laryngeal inflammation may outlive the series of phenomena which mark the progress of the malady, witnessing their inception, course, and disappearance, itself alone rebellious to the approaches of the treatment by which they have been controlled or dissipated.

The larynx may be involved at any, but usually at an early, epoch. Monti[1] states that he has twice seen laryngeal syphilis which arose during intra-uterine life. The most common period of invasion, however, is the first six months after birth. Out of 76 cases of laryngitis, 53 occurred within the first year; and of these, 43 within the first six months, 17 within the first month, and 4 within the first week of life. *Age*, therefore, exercises a predisposing influence upon the eruption of the disease in the larynx. This applies not only to the superficial changes, but also to those malignant forms of laryngeal destruction which the pathologist occasionally encounters.

The laryngeal affection is met with much more frequently in the female than in the male sex, in the proportion of three to two. Laryngitis develops at all periods of the year, without regard to season, although it is naturally aggravated by those atmospheric changes which determine catarrhal conditions.

Imperfect nutrition and forced neglect of hygienic laws sufficiently explain its prevalence among the children of the poor.

The *classification* of the laryngeal lesions of congenital syphilis into secondary and tertiary will not obtain as in the case of acquired disease. Their pathological evolution is not governed by the same laws that regulate the eruption of syphilis in the adult larynx, nor can we predicate, in any given case, the order in which they will appear. In some, not a few, the deeper destructive forms are the first indication of laryngeal mischief.

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[1] Phila. Med. Times, April 28, 1877, p. 336.

This irregularity in their clinical history practically precludes such a chronological division.

In congenital syphilis we may distinguish two principal varieties of laryngeal inflammation. In the one, the changes are limited to the mucous membrane and submucosa; its processes are essentially chronic, and there is little tendency to invasion of the deeper structures. The other is characterized by deep ulceration of an extremely acute nature, which, especially in early life, rapidly involves the cartilages and their envelopes, and constitutes the most frightful form of the disease. In addition to these, there is a third form, in which a gradual deposit of dense fibrous material takes place within the tissues of the larynx, and leads to contraction of its lumen.

These pathological facts justify a classification, based upon the anatomical seat of inflammation. Their separation accordingly into *superficial*, *deep*, and *interstitial*, would be much less arbitrary, and would avoid the confusion which the terms secondary and tertiary involve.

Chronic superficial laryngitis is the condition most frequently met with. It is limited to the mucous membrane and submucosa; is essentially chronic; runs a definite course; gives rise to well-defined changes in the larynx, and may be divided into three stages. The first, or stage of *hyperæmia*, presents nothing diagnostic; the redness is generally diffuse, but is sometimes confined to special areas. It is commonly associated with congestion of the trachea, coryza, and erythema of the fauces and pharynx. Gradually, however, a condition of hypertrophy is developed in the laryngeal membrane, which becomes swollen, thickened, and infiltrated, constituting the second, or stage of *infiltration and hypertrophy*. If the larynx be examined now, its membrane will be seen to be deeply injected, and often slightly translucent from chronic inflammatory œdema. The epiglottis, ventricular bands, and arytenoids have a swollen, rounded appearance and the vocal cords are thickened, reddened, and their excursive mobility impaired. Swelling of the mucous glands sometimes occurs, but the secretion is generally scanty. These changes are occasionally limited to one side of the larynx. Thus, one-half of the epiglottis, its corresponding ary-epiglottic fold, and ventricular band become swollen and thickened, whilst the opposite side is in a state of simple congestion. If the throat be neglected, minute ulcers form by the liquefaction of the superficial portions of the mucous membrane, which partake at first more of the nature of erosions, but which, in long standing cases, involve the whole thickness of the membrane, and sometimes reach the cartilage. Arrived at this period or stage of *ulceration*, the affection becomes stubbornly rebellious to treatment. Under antisyphilitic medication the ulcers heal, it is true, and temporary relief is afforded; but sooner or later fresh ones appear in other parts, thickening and hypertrophy become progressive, and secondary changes are induced in the lungs, either by direct extension through the trachea and bronchi, or as the result of a diminution in the calibre of the larynx itself.

As these ulcers heal there spring up at the periphery of the cicatrices minute, granular, papillary hyperplasiæ; and thus, later on, small areas are found decked with growths which mark the site of past ulceration. At the post-mortem, if the finger be passed over them, their rough granular nature will be at once perceived. These papillary outgrowths, which seem to flourish in a barren, cicatricial soil, are probably more common in the child than in the adult, and the same may be said of the ulcerations which precede them.

Such is the common history of this form of laryngitis. Commencing in early childhood, like an ordinary catarrh, for which it is often mistaken, it gradually but surely asserts its specific nature. To it is due the characteristic cry, and other symptoms referable to the larynx, so common in the early stages of congenital syphilis. The changes which have been described require time for their completion, months and even years elapsing before they reach their full development. Once established, it is doubtful whether the larynx ever returns completely to its normal condition.

From the fact that hoarseness and other laryngeal symptoms were present during the existence of mucous patches on the palate and in the pharynx, it was assumed by Diday[1] that they were due to the presence of these lesions within the larynx, in the neighbourhood of the ary-epiglottic folds. Czermak[2] and Türck[3] have each reported cases where they were seen with the laryngoscope; and one is referred to in the *Gazette des Hôpitaux*[4] where they were found in front of the arytenoids. The patches described by Czermak and Türck are, however, evidently examples of true ulceration, and the account of the laryngeal appearances in the child from the Hôpital Necker is too meagre to be of much value.

The *deep, destructive, ulcerative laryngitis* corresponds, in physical characters, pretty closely to the tertiary inflammation of acquired syphilis. It may follow the superficial form, but generally occurs independently of it. It is sometimes among the first symptoms of infection, and here is most destructive.

Casati[5] has seen deep laryngeal ulceration, caries, and perichondritis in an infant five days old.

Bumstead[6] says that "it remains for future observation to determine whether, in the course of hereditary syphilis, the larynx is primarily attacked, with or without attendant lesions of the pharynx;" and inclines to the belief that the laryngeal affection is always secondary. As a rule, deep pharyngeal ulceration precedes, or coexists with, this form of laryngitis; but *deep ulceration of the larynx occurs, too, without the slightest evidence of pre-existing pharyngeal lesions. Laryngeal ulceration does not commonly follow the pharyngeal destruction of latent syphilis. Those palato-pharyngeal ulcerations which are found in tardy congenital syphilis have little tendency to invade the larynx; their future theatre of action is the nasopharynx and nose.*

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[1] Syphilis des Nouveaux-nés. New Syd. Trans., p. 64–65.

[2] Der Kehlkopfspiegel. New Syd. Soc., 1861, p. 53.

[3] Klinik der Krankheiten des Kehlkopfes, 1867, 161 Fall. and Atlas, xxii.—4.

[4] 1860, No. 51, p. 202.

[5] Op. cit.

[6] Pathology and Treatment of Ven. Dis., Phila. 1879, p. 754.

The first stage of this form of laryngitis consists in a deposit of gummatous material in the structures which subsequently become the seat of ulceration. The resulting ulcers have the same appearance as those found in the tertiary period of constitutional syphilis, and lead to similar deformity and stenosis. They are single or multiple, symmetrical, or confined to one side of the larynx. Their most frequent seat is the *epiglottis;* they are often situated in the ventricles; less frequently on the upper and under surface of the vocal cords, the ary-epiglottic folds, ventricular bands, and plica meso-arytenoidea. They are also observed in the subglottic cavity.

There is a remarkable tendency in the laryngeal ulceration of congenital syphilis to destruction of the deeper tissues—the cartilages and their envelopes; and this predisposition is most marked in those in whom the throat is attacked at an early stage of the disease. There seems to be an inherent virulence in the process which finds in the imperfectly developed laryngeal structures a fertile field for the display of its destructive power. Chondritis, caries, and necrosis are found in over two-thirds of the recorded cases at all ages. Of these, over three-fifths occurred within the first year of life.

Chronic interstitial laryngitis is intermediate between the two inflammations already described, and is rarer than either; but is of considerable practical importance in view of its insidious tendency to stenosis. Much stress has been laid upon this condition in the adult by Dr. Whistler, who has often pointed out its existence and dangers at his clinique, and who describes it as the "Chronic Fibroid Laryngitis of the Tertiary Period." It consists essentially in a gradual deposit of a fibroid material in the tissues of the larynx, which leads inevitably to contraction of its lumen. In such a larynx an acute attack of ulceration is fraught with the utmost danger. These attacks, moreover, seem to favour a greater deposit of the fibrous tissue, and succeeding ulcerations increase proportionately the gravity of the case. In this variety of laryngeal syphilis, Dr. Whistler advocates early tracheotomy.

The following case came under my care while in charge of the clinique of Dr. Prosser James, during his absence from London, and I am indebted to him for permission to publish it. The comparative rarity of the affection, apart from other features of interest, will be sufficient apology for its quotation *in extenso*:—

CASE I.—Henry S., æt. 10, applied at the London Throat Hospital, Oct. 8, 1879, suffering from alarming dyspnœa of a week's duration.

Father syphilitic. Mother has had sore-throat, rheumatism, and two miscarriages, but is otherwise healthy. Patient was small at birth, and was apparently healthy until about two months old, when he became fretful and peevish; would cry out in the night, burrow his head in the pillow, and was frequently seized with general convulsions, during which he would contract his brows and hold his head backwards in a rigid position. There was no loss of consciousness in the convulsion. His head, which was notably large, evidently pained him, and during the fits the anterior fontanelle would protrude. The fontanelle closed at the seventh month. These hydrocephalic symptoms were followed by deafness and discharge from both ears, around each of which was an eczematous eruption at the time of the discharge, and a scurf around the lips and chin. The child began to snuffle, and there was a profuse discharge from the nostrils. At the age of three months lost power of motion in the whole of the left side of the body; sensation in the affected parts being unimpaired. The discharge from the ears lasted until he was three years old, when, together with the deafness, it completely disappeared. The loss of power was dissipated in several months under medical treatment. From his third year to about eighteen months before admission to the hospital, there was an interval of apparent health. He then began to lose flesh, became fretful, the glands of the neck enlarged, the nasal breathing became difficult, and the eyes inflamed and clouded. Under treatment these symptoms gradually disappeared; but he became weaker, and the loss of flesh increased. In July, 1879, had an ulcerated sore-throat, accompanied with slight fever and coldness of the extremities. Since then has lost his voice, at times completely, the aphonia lasting for a week and then subsiding spontaneously. Shortly after the ulceration in the throat appeared, his voice became gruff and hoarse, and complete aphonia supervened in the early part of the following September. During the period of sore-throat his right eye became inflamed, and has been getting gradually worse ever since. There was also dysphagia, with regurgitation of food through the nostrils; and the act of deglutition provoked paroxysms of cough. He complained at the same time of pain in the back of the neck, which compelled him to keep his head thrown back constantly.

From the seventh to the ninth year complained of pain in the bones, chiefly affecting the left knee and shin—the latter was swollen and tender, and the knee-joint painful and enlarged. These disappeared under iodine inunction.

The dysphagia has been steadily increasing, so that at present deglutition of solids is impossible. For the last three weeks has had a severe cough, especially at night, and he is awakened by the suffocation it induces. His mother states that he is exceedingly nervous, but that his memory and intelligence are good.

Condition on application at the clinique.—Is excessively nervous; has a dull, stupid look; his mouth is kept constantly open, and the discharge from the throat is so profuse that he is obliged to keep his handkerchief constantly to his mouth to absorb it. Brows are corrugated. There is well-marked interstitial keratitis of the right eye, with pinkness in the ciliary zone. Both eyes are protruberant, and there is a squamous, coppery eruption on the chin. The nostrils are reddened and sore. On looking into the mouth, well-marked stomatitis is discovered, the gums being nearly three times their original thickness; the swelling is most marked, however, on the hard palate, which is yellowish, anæmic, and infiltrated. The lower central incisors are notched along their cutting edges, and there is a scarlet line along the gums at the insertion of the teeth. The soft palate is covered with stellate, white cicatrices, and the remains of the uvula are seen as a jagged scar, adherent to the left posterior pillar of the fauces. There are also large scars on the posterior pharyngeal wall, and the left posterior faucial pillar is adherent to the wall of the pharynx. Rhinoscopic examination is impossible, but the nostrils are patent, and there is no discharge from the nose or nasopharynx. The tonsils are very much enlarged. It is impossible to see further than the epiglottis with the mirror. This cartilage appears as a distorted, swollen, ulcerated mass, wholly precluding the slightest glimpse of the vestibule, and covered with thick, yellow pus. Behind this irregular mass there is a constant welling-up of the most profuse muco-purulent and frothy discharge from the interior of the larynx. In the left glosso-epiglottic fossa is a deep ulcer with lardaceous base, which extends downwards and backwards towards the pharynx. The papillæ at the base of the tongue are large and tumefied.

Aphonia is absolute, and the boy can only speak in a subdued whisper. Inspiration is loud, stridulous, and is especially alarming if he makes the slightest exertion. Expiration is only difficult on exertion. The larynx does not move during the respiratory act, but when it is grasped between the fingers a rough thrill is felt, and this is also present, and to a greater extent, in the lower part of the trachea. The patient keeps his head thrown forward during the efforts at respiration, and his lower jaw is protruded and at the same time depressed.

Stethoscopic examination of the larynx and trachea reveals a loud roaring sound in inspiration; less marked in expiration. It is difficult to determine its point of maximum intensity, but it seems loudest just above the sternum, in the inter-clavicular notch. The signs in the lungs are almost completely masked by the tracheal breathing; but bubbling and hissing râles can be heard, and the lower portion of the chest is collapsed in inspiration. There is apparently no difference in physical signs in the two sides of the chest. The patient has a loud, ringing, metallic cough, with copious, purulent expectoration. His mother states that he has expectorated occasionally small darkish objects enveloped in slime. Deglutition of liquids is possible, but even finely-divided solids excite cough and are immediately expelled. There is no odynphagia. The cervical glands are enlarged, and the shins are tender on pressure. The boy is greatly emaciated.

The above signs, it seemed to me, justified the diagnosis of stricture of the upper portion of the trachea, and, probably, stenosis of the larynx, and my first impulse was to call a consultation on the advisability of immediate operative interference. But upon reflection, I deemed it better to try what the intervention of medicine would accomplish. He was, accordingly, put upon mercury and potassium iodide in large doses, and the constant inhalation of the vapour of the iodate of zinc; with instructions to be sent for if the dyspnœa should not abate within the twenty-four hours. I saw him again the following day. The breathing was much more quiet and the secretion less profuse. In other respects his condition was the same as before. The amount of the iodide was increased, the aggregate daily dose amounting to about ℥j.

Oct. 12. Has been steadily improving: rests well at night; coughs but little, and the cough is losing its metallic character. The secretion has diminished about one-half, but is still very abundant. Since last seen, has coughed up two black, rounded bodies, enveloped in tough, adherent mucus. These were unfortunately not preserved. Their expulsion was followed by immediate improvement in deglutition, so that he now can swallow hard crusts of bread without difficulty. The mother states that since the 9th his voice has improved; but I can detect no change. The ulceration of the right half of the epiglottis has so far contracted as to permit a view of the corresponding side of the larynx. This discloses deep, active ulceration of the right ary-epiglottic fold and upper surface of the ventricular band. Nothing further can be made out. The ulcer in the glosso-epiglottic fossa is almost healed.

13th. Cough very slight; no dysphagia; can speak in a hoarse, gruff, brassy voice.

17th. Ulcer of lingual fossa healed; can speak much better.

20th. Voice much clearer. The laryngeal ulceration has completely healed, and a satisfactory view of its cavity can now be obtained, although laryngoscopic examination is difficult from the rigidity and adhesion of the epiglottis. This cartilage is perfectly motionless, and bound down to the wall of the right pyriform sinus by cicatricial bands. Its free border is swollen, rounded, and deeply notched, giving it a crenated appearance. There is also adhesion between it and the right ary-epiglottic fold. There is a large cicatrix on the ventricular band of the same side, which extends apparently into the ventricle. The arytenoids are swollen and almost motionless. The right vocal cord is firmly fixed in the position of lateral fixture, and is deeply congested. The left cord moves with comparative freedom towards the median line in phonation. Its free border is deeply curved, but otherwise it has a normal appearance. There is a large swelling between the arytenoids, its left half resting on the left vocal cord. This I take to be the hypertrophied meso-arytenoid fold.

The mucous membrane of the trachea is reddened, and there is a well-defined bulging of its anterior wall, about the situation of the second and third cartilaginous rings.

Although all ulceration has ceased, and cicatrization is complete, the whole right side of the laryngeal cavity, with the ary-epiglottic fold, arytenoid, and ventricular band of the opposite side, is the seat of a peculiar albuminous-looking infiltration or thickening. A somewhat definite idea may be obtained of its appearance by comparing it to the fibroid tissue which one sees in cirrhosis of the lung, or in a thickened pleura. The bluish tint of these conditions, however, is wanting, and is substituted by a deep gray pallor.

The eye is much worse, and there is pronounced kerato-iritis. The treatment consists now in tonic doses of mercury combined with cod-liver oil, and the inhalation of zinc vapour.

Nov. 17. Can speak in a very fair tone of voice, though there is still a slight twang. There is considerable motion to-day in the right vocal cord, and it approaches the middle line with considerable ease. Its anterior half is still very red. Both cords are bowed in phonation. The thickening of the inter-arytenoid fold has somewhat diminished, and the eye is beginning to improve under the instillation of atropia.

25th. Very little motion in the right vocal cord, which is again deeply reddened.

Dec. 3. Return of mobility in right vocal cord. The boy's general health has greatly improved; the voice is very fair, and presents nothing abnormal, except that it evidently requires a slight amount of effort for its production. His mother states that he is apparently perfectly well—a statement which his robust condition fully confirms. There is still some cloudiness of the cornea and pinkness in the ciliary zone.

In the early part of January, 1880, he was brought to me again for inspection. The larynx is still the seat of the fibroid hypertrophy; the cords move freely towards the median line, which they do not reach, however; and their free edges are still bowed. The boy shows no external signs of his disease, except some haziness of the cornea.

The chief interest in this case centres in the trachea and larynx. That the dyspnœa was due to stricture of the former I think there can be no doubt, both from the physical signs of tracheal stenosis and subsequent laryngoscopic examination. I was inclined to believe that there was also more diminution in the calibre of the larynx than was afterwards found. The coexistence of this fibrous form of laryngeal syphilis with other interstitial manifestations of the disease, notably the keratitis, has suggested their mutual dependence. May we not, therefore, look for this condition of the larynx at a period when these interstitial changes commonly develop?

It typifies the acute destruction which has been described as characteristic of the deep ulceration met with in congenital syphilis. Not having seen the bodies coughed up by the patient, I cannot positively affirm that they were pieces of necrotic cartilage; but in view of the immediate relief which followed their expulsion, such an assumption is not unwarrantable. I know of no other recorded instance of paralysis of the vocal cords in congenital syphilis. Their bowed condition, which persists, is probably due to inflammatory infiltration of the thyro-arytenoidei muscles, and the thickening of the interarytenoid fold prevents their perfect approximation.

Dr. Felix Semon,[1] at a recent meeting of the Pathological Society, showed the larynx of a boy, aged $5\frac{3}{4}$ years, who had suffered from dyspnœa and aphonia since shortly after birth. Post mortem, the epiglottis, ventricular bands, and ary-epiglottic folds were found to be the seat of this fibroid deposit. He also presented the larynx, taken from the younger brother of this patient, in which the epiglottis, ventricular bands, ary-epiglottic folds, arytenoid cartilages, and vocal cords were chronically thickened and hypertrophied. The upper portion of the trachea was constricted.

LESIONS OF THE TRACHEA AND BRONCHI.—The trachea is the seat, though much less frequently, of the two forms of syphilitic inflammation described as occurring in the larynx. Apart from superficial changes, well-pronounced tracheitis and deep ulceration are probably rare. The condition most commonly found is *congestion*, generally disposed in streaks of deep red, which extend into the bronchi. In Dr. Sturges's case (*vid. infra*), the redness was confined to small, circumscribed, circular areas, resembling somewhat a cutaneous rash.

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[1] Vide Med. Times and Gazette, Feb. 21, 1880, p. 221.

In those which I have had the opportunity of examining post-mortem, the changes consisted chiefly in streaked congestion, with moderate swelling of the mucous membrane. In two of them there were numerous small ulcers confined to the upper third of the anterior wall, and chiefly limited to the mucous membrane. Small granular hyperplasiæ existed in their vicinity.

Mayr[1] found the membrane of the upper trachea erythematous and swollen. In 24 cases analyzed by Gerhardt,[2] 2 were of congenital origin. Ulcerations and cicatrices have been observed by Hüttenbrunner and Woronchin (*vid. infra*), and in Sturges's specimen there was a stellate cicatrix in the upper portion of the tube.

An interesting illustration of tracheal stenosis is recorded by Steiner[3] in a boy æt. 12 :—

> The post-mortem revealed palato-pharyngeal inflammation, with swelling of the mucous follicles and œdema of the uvula; redness and swelling of the mucous membrane of the larynx and upper trachea, with swelling of the glands and submucosa, and enlargement of the posterior tracheal lymphatic ganglia. The lower half of the trachea was the seat of cicatricial bridles, which considerably diminished its lumen; whilst on the right side, 2½ c.m. above the bifurcation, was found a small polypus, the size of a pea, covered with mucous membrane, and homogeneous and pale-red on section.

From an analysis of the recorded instances in which the bronchi have been found diseased, it would appear that the same pathological changes are found in them as in the larynx and trachea. These consist either in hyperæmia, thickening, superficial erosion, and granulation, or in deep, destructive ulceration, and stenosis. The bronchial tubes are filled with a bloody or muco-purulent secretion, and the neighbouring lymphatic ganglia swollen and infiltrated, and sometimes pigmented. Moliere[4] found the smaller bronchi obliterated by a granular substance. Steiner[5] observed stenosis of the right bronchus, and dilatation of the left. The commencement of the former was constricted, partly by a valve-like, projecting ledge of mucous membrane, and partly by a cord-like cicatrix, which extended into the tube from the trachea to the extent of about 2½ c. m., causing stricture of the bronchus. The adjacent bronchial glands were swollen, caseous, and pigmented, and the pharynx, larynx, and trachea diseased.

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[1] Zeitschr. Gesellsch. d. Aerzte zu Wien. Trans. in the Annales des Mal. de la Peau et de la Syph. Tom. iv., 1852, p. 288.

[2] Ueber Syphilitische Erkrankungen der Luftröhre. Deutsches Archiv für Klin. Med. Bd. II., 1867, p. 538.

[3] Jahrbuch für Kinderheilkunde, 1865, Bd. VII. II. § 64.

[4] Observation de Syphilis Congénitale. Annal. de Dermatologie, tom. ii. 1869–70, p. 407.

[5] Loc. cit.

Gerhardt[1] made the diagnosis of stricture from the physical signs of obstruction of the left bronchus, which disappeared under iodide of potassium. There was also destructive ulceration of the pharynx, uvula, and arch of the palate; the epiglottis was swollen, erect, scarcely movable; and there was an ulcer of the left aryepiglottic fold.

Woronchin[2] discovered in a boy, aged fourteen months, a large ulcer, with elevated, clean-cut edges, at the beginning of the right bronchus, and on the posterior tracheal wall.

Its left half was deeper than the right, and had caused necrosis of the cartilaginous rings. At its bottom was a caseous node. The ulceration extended along the anterior wall of the bronchus into the substance of the lung. There was also gummy ulceration of the greater wing of the sphenoid (left) bone, and partial necrosis of the lower jaw. The cervical and bronchial glands were swollen and cheesy, and the lungs were the seat of pneumonia, atelectasis, and emphysema.

Hüttenbrunner[3] found stricture of the bronchi, at their bifurcation, in a girl twelve years of age:—

The uvula and palatal arches were completely destroyed, and their site occupied by lardaceous material and cicatrices. The epiglottis, which could be felt with the finger, was wrinkled, distorted, and covered with warty excrescences, which extended from the base of the tongue, on both sides of the larynx, as far downwards as the vocal cords. From the latter, as far as the end of the trachea, were abundant, streaked, superficial cicatrices, which were more marked upon its upper anterior wall. Immediately above the bifurcation, and somewhat to the right, was a radiated scar, which had penetrated to the submucous tissue, and which extended upwards as far as the sixteenth tracheal ring, and downwards to the beginning of the right bronchus. From this cicatrix there passed another cord-like band, which jutted out into the trachea, and was inserted into the posterior wall of the left bronchus, constricting it to the size of a goosequill. The bronchiæ, as far as the fourth division, presented cicatrices similar to those observed in the trachea, and in some places were dilated to the size of the little finger.

Laryngeal Symptoms. *Voice and Cry.*—The cry in the infant, and the voice in the older child, exhibit all grades of phonetic impairment from slight huskiness to the toneless whisper of absolute aphonia. At first the cry has a shrill, piping tone that has been compared by West and Zeissl to the sound of a child's toy trumpet. This sometimes degenerates into a peculiar squeak. Soon it assumes a characteristic vibratory twang, difficult to describe; but not unlike the vocal resonance which is heard just above the level of a pleuritic effusion. This is probably due to the sonorous vibrations of the thickened mucous membrane, which, at a stage when infiltration has not advanced to consolidation, is loose, and admits of being thrown into exaggerated vibration by the current of expired air. Later the voice becomes harsh, cracked, and finally completely lost. It is surprising, however, to what an extent the larynx may be involved without impairment of the voice.

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[1] Loc. cit.

[2] Jahrbuch für Kinderheilkunde. Bd. VIII., 1875, p. 108.

[3] Ibid. Bd. V., 1872, p. 338.

Cough is frequently present, and is a very distressing symptom. It is paroxysmal, suffocative, intermittent, raucous, and often followed by vomiting. The impairment of phonetic quality may be of diagnostic value in those cases where corresponding changes in the voice are absent. The guttural character of the cough is thought by Casati to depend nearly always on laryngeal ulceration. The paroxysms may be excited by crying, or attempted deglutition; but are generally worse at night, leading to attacks of dyspnœa, which threaten suffocation. In Hüttenbrunner's case they closely resembled the paroxysms of pertussis. There is not much *expectoration*, except in the deep ulcerative form, when it is very profuse and muco-purulent, filling the larynx, and interfering with laryngoscopic examination. The amount of secretion may be taken as an approximate measure of the extent to which the destructive process has advanced.

Respiration is seriously embarrassed; the rhythm hurried, and often interrupted. Attacks of dyspnœa are brought on by coughing and suckling, and are worse at night, leading to orthopnœa, cyanosis, and convulsions. Sometimes the breathing has a *bronchial* sound, and is stridulous and stertorous, according to the amount of obstruction. The respiratory distress is, as a rule, commensurate with the amount of laryngeal stenosis; but secondary changes in the trachea, bronchi, and lungs are sometimes important factors in its production. It is also modified by the degree of nasal obstruction from coryza.

Deglutition is difficult, and sometimes painful and impossible. It is caused by pharyngo-laryngeal swelling and ulceration; but we may assume that, in rare instances, it is due to lesions of the œsophagus itself. Whitehead[1] relates a case where *hemorrhage* from the vagina took place on the second day after birth, and, a few hours later, from the throat.

Laryngismus occurs quite frequently, and is sometimes the immediate cause of death. In a case reported by Barlow,[2] it was associated with disease of the meninges of the brain. Van Harlingen[3] has reported a case in which a peculiar intermittent laryngeal spasm was associated with bone syphilis:—

> The spasm occurred in frequent attacks of brief duration, coming on suddenly, without cough or other premonitory symptoms, lasting only for a few seconds, and passing away with a long-drawn breath, followed by cough. During the attack the breath was checked entirely, and the child made agonized efforts at inspiration. The spasms appeared to be excited by handling the infant, and particularly by laying it on its back. In less than two weeks later they were not so marked.

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[1] Op. cit.

[2] Trans. Path. Soc. of London, vol. xxviii., 1876-77, p. 287.

[3] Phila. Med. Times, Oct. 11, 1879, p. 3.

External Signs.—The superficial laryngitis usually makes its appearance in the secondary stage of the disease, whilst the deeper destructive process occurs later, in the period of tertiary lesions. This order of eruption, however, is by no means invariable, for deep ulceration is found among the earliest symptoms of infection. These inflammations, accordingly, are associated with the corresponding external phenomena of these periods. There is, however, no good reason to believe that any definite relationship exists between the laryngeal and cutaneous lesions. In the course of a laryngitis the chronological succession of the cutaneous syphilides may be traced throughout their clinical history; they appear and disappear without any appreciable influence on the laryngeal inflammation. It is an interesting fact, that while the external lesions yield readily to antisyphilitic medication, the laryngeal have a tendency to persist. The larynx seems to be the last to surrender to therapeutic influence.

Among the secondary *complications* in the lungs, are *congestion*, *atalectasis*, *emphysema*, *bronchitis*, *pleurisy*, and *pneumonia*. The latter is often the immediate cause of death. But the condition which commands most serious attention is the *sudden and fatal laryngeal œdema*, which occurs without warning, and from which the patient dies before assistance can be obtained.

Mahon[1] has seen death from pulmonary consumption, in an infant, with aphthæ in the mouth, dyspnœa, and many ulcerations in different parts of the body; and Whitehead[2] has observed laryngeal phthisis as the result of syphilitic inflammation of the larynx. In a specimen shown to me by Dr. Barlow, the left apex contained a small cavity surrounded by a peculiar kind of infiltration, and the larynx, trachea, and bronchi were filled with false membrane. The patient had suffered for some time from laryngeal symptoms, and finally died from laryngo-tracheal diphtheria.

Diagnosis.—It is only exceptionally that mistakes may arise in the recognition of the deeper forms of bucco-pharyngeal syphilis. Deep ulceration of the palate, pharynx, and nose, showing a disposition to centrality of position and invasion of the bone, leading to perforation of the palate, adhesions, and stenosis, and healing under mercury and potassium iodide, furnishes abundant proof of its specific nature. When such a condition is met with, syphilis is its cause in the overwhelming majority of cases, and the burden of the diagnostician will be to prove it of other origin. Practically the diagnosis will involve its discrimination from tuberculosis and lupus. It is unnecessary to enter into the clinical and pathological history of these diseases, from which it may be differentiated, by the diagnostic characters already described, by the *ensemble* of signs which are the accepted physical evidence of congenital syphilis, by the history and treatment of the case. Where syphilis appears primarily in the pharynx, and other proof of its existence is wanting, there is also very little room for doubt. Horace Green[1] taught that tuberculosis may originate primarily in the pharynx, a doctrine since supported by Trélat[2] and Frankl;[3] but it is doubtful whether it can occur without preceding or coexistent implication of other organs. That lupus of the throat may be mistaken for syphilis, was pointed out by Arnal,[4] who first described it. Primary lupus of the pharynx is very rare, and doubt will only arise when it invades that cavity from without.

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[1] Recherc. Import. sur la Malad. Syphilit., etc., Paris, 1804, p. 433.

[2] Op. cit., Case XXV.

The laryngeal affection in its first stage may be mistaken for simple laryngitis, and when associated with chronic bronchial irritation or pulmonary inflammation, may be confounded with phthisis laryngea. But the greatest difficulty will arise in its discrimination from *laryngeal growths.* Here, if laryngoscopic examination be impossible, the diagnosis may be involved in doubt.

That the iodide of potassium possesses an influence over the ulceration of scrofula equal to that which it exerts upon the tertiary lesions of syphilis, is a popular fallacy which obtains in some quarters even at the present day. Rapid cicatrization under this drug practically settles the question of syphilis; but the diagnosis can be made, in the majority of instances, without invoking its aid. When ulceration attacks the bone the action of the iodide may be slow. Here, if the processes of nutrition be stimulated by tonic treatment, and especially by cod-liver oil, the processes of repair will be accelerated. But this obviously does not warrant the conclusion that the destruction is not syphilitic. The power of cod-liver oil over the events of congenital syphilis is the same as that which it exercises in other wasting diseases, an influence that is often overlooked. The assumption, therefore, that an ulceration which heals under this drug either alone or combined with the iodide of potassium, is necessarily scrofulous, diverts the mind from a rational interpretation of the case.

The *prognosis* will be influenced greatly by the *age* of the patient; the earlier the throat is attacked the more serious the results. Pharyngo-laryngeal ulceration occurring within the first year is almost invariably fatal. Deep ulceration of the larynx, in view of its destructive tendency, offers a grave prognosis at any period. Pharyngeal ulceration, however, appearing late, or as a manifestation of tardy syphilis, yields gracefully to iodide of potassium. The prognosis in chronic superficial laryngitis is more favourable as regards life, though the tendency to laryngeal œdema and spasm should not be lost sight of. This form of laryngeal syphilis is exceedingly persistent and intolerant of treatment. It is often the *primum virens* and the *ultimum moriens* of the disease. As Vidus Vidius said of syphilis: "it makes many truces, but never peace."

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[1] Treatise on Diseases of the Air-Passages, N. Y. 1852, p. 118.

[2] Paper read before Acad. de Méd., 27 Nov. 1869. L'Union Médicale, 1869, p. 778.

[3] Berliner Klinis. Wochenschr., Nov. 1876.

[4] Journal Hebdom., 2me S. tom. viii. 1832, p. 99.

In all forms of laryngeal syphilis death frequently takes place from acute œdema. The prognosis will depend, furthermore, upon the gravity of the general infection and the secondary complications in the lungs.

Treatment.—In acute laryngeal syphilis the treatment should consist in mercurial inunction over the thyroid cartilage, the inhalation of calomel or iodate of zinc in the form of vapour, and the internal administration of potassium iodide. The aggregate daily dose of the latter should be large, and should be pushed rapidly to the verge of iodism. Should the inflammation not yield within twenty-four to forty-eight hours, or should it show a disposition to advance, I believe it to be the duty of the surgeon to open the trachea.

In the more chronic forms, mercury in tonic doses combined with iodide of potassium should be exhibited, the local treatment consisting in the use of stimulating pigments and inhalations. As a topical application to the pharyngeal ulceration great reliance may be placed upon iodoform, or the vapour of the iodate of zinc.

In addition to those already referred to, brief mention may be made of the following illustrative cases, for fuller particulars of which, the journals and works, from which they have been taken, should be consulted. Rosen[1] met with caries of the palate in a girl aged 11. Swediaur[2] saw a syphilitic ulcer in the throat of a child who had inherited the disease from its father. The ulcer was similar in character and position to one with which the father had previously been affected. Cliet[3] observed ulceration and softening of the mucous membranes of the gums, palate, and mouth in an infant. Ulceration of the pharynx and caries of the nasal bones, in a boy aged eighteen, is described by Balling.[4] A number of cases of laryngitis and buccal ulceration are related by Whitehead,[5] but no mention is made of the post-mortem appearances. Sperino[6] relates a case of ulceration of the palate, tonsils, and posterior laryngeal walls in a child æt. eleven. Treated as scrofulous, it destroyed the soft palate, led to caries of the vault of the hard palate, which, destroying the palatine apophyses of the superior maxillæ, established a communication with the nasal fossæ—the child's voice was hoarse and unintelligible; it suffered from cough and purulent expectoration, dyspnœa, and light fever with nocturnal exacerbations. These symptoms disappeared rapidly under iodide of potassium. Two cases of palatal ulceration and necrosis in subjects over forty, and one of naso-palatine osteitis in a lad of seventeen, are referred to by Ricord.[7]

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[1] Dis. of Child., Lond., 1776, trans. by Sparrman.

[2] The Treatment in Ven. and Sylph. Dis., Lond. 1819, vol. ii. p. 9.

[3] Observat. Med.-Chir. rec. à l'Hôp., de la Char. de Lyon, 1823, p. 90, 2me partie.

[4] Ueber angeborene. und Erbliche Syphilis. In Hecker's Litterar. Annal. der Gesammt. Heilkunde, Berlin 1832, p. 129 et seq.

[5] Op. cit.

[6] La Syphilisation etudié comme méthode curative, etc., Paris, 1855, p. 421, Obs. 82.

[7] Discussion sur la Syphilis larvée. Bull. de l'Acad. de Méd., Oct. 1853, tome xix. p. 27.

Yvaren[1] gives the history of a female in whom syphilis made its first appearance at the age of seven. At twenty-two, ulceration of the palate occurred, with pain in the throat, which, at first fugitive, finally became fixed. A month later, fresh ulceration broke out which destroyed the velum; respiration became difficult and stridulous, and suffocation was imminent. On depressing the base of the tongue to cauterize the larynx, the epiglottis was seen to present an appearance like the comb of a cock, and to be divided from above downwards by a large ulcer.

Zeissl[2] has seen ulceration of the tonsils, velum, and hard palate, accompanied with dyspnœa, in a boy three and a half years old. Fournier[3] alludes briefly to two cases, in one of whom, æt. eighteen, was found a gummy tumour of the velum and an ulcerated tubercle of the posterior part of the pharynx; in the other, æt. twenty-five, a gumma of the velum. Neither of these patients had even had the slightest sign of venereal disorder. Melchior Robert[4] describes, as an example of "vérole d'emblée," the case of a woman æt. forty-two, who had, upon the velum, an oval patch which seemed to be the *avant coureur* of perforation. A most interesting illustration of congenital laryngeal syphilis, in a girl æt. eleven, is related by Czermak.[5]

> In the middle of the hard palate were two suppurating ulcers, situated alongside of each other, which had reached the bone; the soft palate was ulcerated and the uvula completely destroyed. Cicatrices of old ulceration existed in its vicinity; the posterior wall of the pharynx presented a dirty yellow appearance, and the epiglottis was enormously swollen and injected, and presented on the right side a large mucous patch (?) covered with thick, yellow pus. The entrance of the larynx was so constricted that only the posterior portion of the cords was visible, and the air entered and departed from the organ with a loud noise. A few days later, an ulcer formed on the left of the epiglottis, "small but deep, in such a manner that the epiglottis, still swollen, presented a form altogether peculiar, of three lobes." An abundant purulent secretion issued from the left side, between the epiglottis and ary-epiglottic ligament, which rendered respiration difficult, and provoked paroxysms of cough. When the swelling of the epiglottis had subsided, the cords were seen to be the seat of "two patches of a yellowish colour with sharp angles, and some twentieths of an inch long." Laryngotomy was performed. Infra-glottic examination then revealed, between the free border of the epiglottis and right arytenoid, an opening limited laterally, in the projected image, by a morbid cushion and the right vocal cord. Through this opening the view extended higher up into the pharynx. "It was curious," observes the author, "to examine the constricted glottis, from below upwards, during phonation. When I required the patient to make a sound, which of course she could not accomplish, I immediately observed the borders of the glottis to approach one another, and to leave but a very narrow oblong crack, or rather a furrow, which, however, was not rectilinear, nor equally narrow throughout its length, because of the swelling and puffing of the vocal cords, which still existed, although somewhat diminished. Also, in closing the canula the voice was very feeble and hoarse." Some weeks later the swelling subsided, the voice became nearly natural, and the patient made a good recovery.

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[1] Des Metamorphoses de la Syphilis, etc. Paris, 1854, p. 339.

[2] Wochenblatt d. Zeitsch. d. k. k. Gessellsch. d. Aerzte zu Wien, 1856, No. 22 (Arch. f. k'heilkunde, 1858, Bd. I. Zweite Hälfte. S. 29).

[3] Loc. cit. [4] Mal. Vén., Paris, 1861, p. 701. [5] Loc. cit.

Risdon Bennett[1] was consulted by a girl of sixteen, whose soft palate had been entirely destroyed, and in whom ragged, dirty, livid ulceration of the back of the pharynx and tonsils coexisted with intense laryngeal obstruction with aphonia and tenderness over the organ. The apex of the left lung presented the physical signs of commencing consolidation. The pharyngeal ulceration cicatrized, the laryngeal distress was dissipated, and the trouble in the lung resolved in nine days under the iodide of potassium. The author, however, is disposed to look upon these cases as strumous. A similar example of destruction and perforation of the palate is recorded by Williams.[2] A case in which syphilis made its first appearance by perforating the nasal septum, and finally led to destruction of the hard palate, is reported by Bouchut;[3] one of laryngeal ulceration by Chabalier;[4] and Roger[5] relates an example of perforation, caries, and purulent infiltration of the thyroid cartilage, abscess of the thyro-hyoid membrane, and purulent infiltration of the crico-thyroid muscle, in a girl nine months old. In Gerhardt's case, referred to above, there were tumefaction and paralysis of the epiglottis, with lardaceous ulceration of the ary-epiglottic fold. Herard[6] reports, as scrofulous, ulceration and necrosis of the palate and nose, which is obviously syphilitic, and in the discussion which followed his paper, Hervez de Ghégoin referred to two similar cases under his observation, which were cured by the Liquor Van Swieten.

Türck[7] met with deep ulceration of the epiglottis and ventricular band; Bouchut[8] refers to an infant, under the care of Deville, in whom embarrassed respiration coexisted with ulceration of the palatine vault, and velum; and Holmes[9] has performed tracheotomy for congenital syphilis of the larynx. Frankel[10] describes, and figures the post-mortem appearances of the larynx in an infant, dead of syphilis. There was perichondritis, with partial necrosis of the cricroid, perichondritis and loosening of the left arytenoid, induration and fatty degeneration of the posterior crico-arytenoid muscles, the arytenoideus, and the superior laryngeal nerve of the left side. A similar case is recorded by Schrötter,[11] and Rauchfuss[12] says that he has met with perichondritis laryngea in congenital syphilis.

[1] Med. Times and Gazette, Jan. 11, 1862, vol. i. p. 31.

[2] Loc. cit. p. 66.

[3] Gaz. des Hôp. No. 90, Aug. 1865.

[4] Journal de Méd. de Lyon, 1st an. tom. 1, 1864, p. 345.

[5] L'Union Médicale, 1865, Nos. 10 and 17, Obs. XVII. p. 233.[1]

[6] Bull. de la Soc. Méd. des Hôp., tom. ii. 2me série, S. 1865, p. 64.

[7] Loc. cit.

[8] Mal. des Enfants, 1867, p. 1050, Obs. III.

[9] Op cit. p. 358.

[10] Wiener Med. Wochenschrift, 1868, Nos. 69 and 70.

[11] Jahresber. für 1871–73. Wien, 1875, p. 80.

[12] Gerhardt's Handbuch, 1878. Bd. iii. Zweite Hälfte, p. 241.

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[1] Roger has also recorded a case of ulceration of the palatine vault, velum and pillars of the fauces, with chronic laryngitis, in the Bull. de la Soc. Méd. des Hôp., 2me S. tom. 2, 1864, p. 33.

On the authority of this writer, there are notes of deep ulceration and perichondritis in infants from two to three months old, in the post-mortem records of the Foundling Hospitals of St. Petersburg and Moscow.

A number of cases of destructive laryngeal inflammation in infants are reported by Casati,[1] which present many features of interest. Bulkley[2] has observed ulceration of the throat and laryngeal obstruction, in a child who had also syphilitic disease of the lung; and a child is referred to in the *British and Foreign Medico-Chirurgical Review*,[3] upon whom tracheotomy was performed for syphilitic laryngitis.

Van Buren and Keyes[4] give the history of a boy aged 16 years, with chronic destructive disease of the nose, including both nostrils, and part of the upper lip, whose throat had been ulcerated in childhood, destroying the uvula, and leaving the soft palate adherent to the pharyngeal wall. The case was progressing to the usual unfavourable termination under antiscrofulous treatment, when iodide of potassium was given, and the cure was complete in a few weeks.

Handfield Jones[5] describes a large, perforating ulcer of the soft palate, in a girl aged 13 years, which yielded to the iodide. Catti[6] has operated for pharyngeal stenosis in a lad 15 years of age.

The soft palate was bound to the posterior pharyngeal wall by cicatricial adhesions; the hard palate was covered with cicatrices; and the space between the posterior wall of the pharynx and base of the tongue was filled with a red mass, in whose centre a slit existed, forming the only communication with the structures beneath. Across this opening were stretched cicatricial bands, which offered a delusive resemblance to the vocal cords. The larynx could not be seen, but two years before, the epiglottis and ary-epiglottic folds were found thickened and cicatrized, and the ventricular bands swollen.

In 1876, Dron[7] read a paper on tardy syphilis, in which he gave a number of instances in which the naso-pharynx was the seat of ulceration. In the discussion which followed, Horand observed that he had also met with ulceration in that part of the pharynx. In a girl aged 4 years, Reimer[8] found the mucous membrane of the epiglottis and entrance of the larynx reddened and swollen, and a papillomatous excrescence, resembling a broad condyloma, on the left vocal cord.

After death, the epiglottis was seen to be œdematous; there was intense redness, and a millet-seed ulcer of the right vocal cord. The edges of the ulcer were sharp and clean-cut, and its base lardaceous. On the under surface of the cords were two ulcers, the size of peas, with callous edges, which had penetrated to the cartilage. The mucous membrane of the trachea and bronchi was scarlet and loosened.

Ulceration of the throat in a boy, treated unsuccessfully for scrofula, but rapidly healing under the iodide, is related by Wilks.[1] Pharyngeal ulceration has been seen by Israel,[2] who refers to similar cases reported by Edward Wohlaur, Orsichowsky, and Schimburg.

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[1] Loc. cit.

[2] Rare Cases of Congenital Syphilis, N. Y. 1874.

[3] 1875, vol. ii. p. 29.

[4] Op cit. 1874, p. 599.

[5] Med. Times and Gazette, March 27, 1875, p. 338.

[6] Wiener Med. Presse No. 18, May 2, 1875.

[7] Loc. cit.

[8] Loc. cit. p. 105.

Gressent[3] saw ulceration and destruction of the velum and tonsils, in a girl under the care of Ricord ; and ulceration of the palatine vault in a woman 41 years of age. This patient had suffered since her eleventh year, from sore throat and aphonia. The author also refers to a woman, under the care of Trousseau, in whom ulceration of the mouth and pharynx appeared at the age of twenty.

Characteristic examples of bucco-pharyngeal ulceration have been collected by Chaboux ;[4] Wendt[5] has observed adhesion of the palatine arches with the posterior pharyngeal wall ; and Campbell[6] reports, for Bulkley, loss of the palate and uvula in a boy of eight. An ulcerating syphilide in a child fourteen months old, associated with multiple ulceration of the palate and velum, is recorded by Dujardin-Beaumetz.[7] Levis[8] has seen the pharynx so constricted as to scarcely admit the point of the little finger. Deglutition of solid food was impossible, and liquids were swallowed with difficulty. Klink[9] describes an ulcerating syphilide of the face, which involved the mouth ; Laschewitz,[10] bucco-pharyngeal ulceration in a girl aged 18 years ; and Owen,[11] destructive ulceration of the right tonsil, soft palate, and back of the pharynx, in a girl of five. The following year a relapsing ulceration attacked the palate and both tonsils.

Extensive palato-pharyngeal ulceration, associated with a destructive syphilide of the face, is recorded by Atkinson.[12] It had been treated as lupus; but, being recognized as syphilitic by the author, was arrested promptly by appropriate remedies.

Bumstead[13] refers to six unpublished cases of laryngeal syphilis under the care of Lefferts. In three the destruction was limited to the epiglottis, which in two was totally destroyed, and in one, loss of half of the upper border existed. In one of the two cases of total destruction the ulceration had extended to the right aryepiglottic fold. In the three remaining there was general destruction of the laryngeal tissues with stenosis. In all there was destruction of the pharynx.

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[1] Lancet, Feb. 19, 1876, vol. i. p. 283. See also Wilks and Moxon, op cit. p. 356.

[2] Langenbeck's Archiv, Bd. xx. 1876, p. 302.

[3] Des Manifestations tardives de la Syphilis Héréditaire. Thèse de Paris, No. 233, 1874, pp. 34, 37, and 45.

[4] Op cit.

[5] Ziemssen's Cyclopædia, Am. ed. 1877, vol. viii. p. 75.

[6] Archiv. of Dermatology and Syphilis, 1878, p. 240.

[7] L'Union Médicale, 1879, No. 2, p. 13.

[8] Med. and Surg. Reporter, May 3, 1879, p. 381.

[9] Vierteljahr. für Dermatologie und Syphilis, 1877, Bd. ix. p. 417.

[10] Ibid. 1878, Hefte ii.p. 269.

[11] British Medical Journal, 1879, vol. i. p. 46.

[12] Loc. cit. p. 71.

[13] Op. cit. p. 754.

A large ulcer of the palatine vault in an infant, fourteen months old, is described by Lalesque.[1] Dr. Barlow, at a recent meeting of the Pathological Society,[2] showed the larynx of a child, eleven months old, who had suffered for a long while from chronic laryngitis. The autopsy revealed œdema of the aryepiglottic folds, erosion of the mucous membrane above and below the vocal cords, and within the ventricles, and some scanty, thin. and closely-adherent laminæ of false membrane. The speaker said that Dr. Warner had met with warty growths in the larynx of a congenital syphilitic. Dr. Lees referred to a case which required tracheotomy; and Dr. Allen Sturge presented the larynx of a boy, aged two and a half years, who had suffered from dyspnœa and aphonia ever since his twelfth month.

Death took place from spasm of the laryngeal muscles, brought on by exposure to a high wind. The left aryepiglottic fold was much swollen; the vocal cords partially destroyed by ulceration; and deep cicatrices radiated upwards and downwards from them. There was a stellate cicatrix in the upper portion of the trachea, and from the ventricles protruded growths of an uncertain nature, which were continuous along the middle line in front.

At a meeting of the New York Society of German Physicians,[3] Dr. Brandeis mentioned a girl of twelve, who was deaf in both ears, had parenchymatous keratitis, and perforation of the hard palate; Dr. Adler referred to a boy of fourteen years of age, in whom the larynx had been opened for pharyngeal stenosis; and Dr. Jacobi stated that he had observed necrosis of the vomer, with subsequent brain syphilis, in the fourteenth year. In a girl, aged three and a half years, Dr. Eröss[4] found a hypertrophic condition of the epiglottis, associated with slight œdema of the aryepiglottic folds and inflammation of the vocal cords. On the left cord was a growth which resembled a gummy tumour.

A few instances are on record where it was thought that hereditary and acquired syphilis were present in the same individual. Thus, Trousseau[5] states that he has seen a chancre in the pharynx of a congenital syphilitic; Dowse[6] met with ulceration of the faucial pillars, pharynx, epiglottis, vocal cords, and arytenoids, which he believes was due to "reacquired hereditary syphilis;" and Lennox Browne[7] alludes to a young man with the characteristic signs of congenital disease, "who had been under medical care for palatal ulceration, acknowledged to the primary affection, had the scar of a chancre, and some years after his first appearance as a patient suffered from syphilitic invasion of the larynx."

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[1] Annal. de Dermatologie et Syphiligraphie, 2me s. tom. i., 1880, p. 129.

[2] Vide Lancet, April 10, 1880, p. 566.

[3] New York Medical Journal, March, 1880, vol. xxxi., No. 3, p. 307.

[4] Jahrbuch. für Kinderheilkunde, N. F., Bd. xv., 1 Heft. p. 139.

[5] Vide Bumstead, edition 1864, p. 624.

[6] Trans. Clinical Soc. of London, vol. x., 1877, p. 169.

[7] The Throat and its Diseases, London, 1878, p. 212.

The following cases, under the care of Dr. Morell Mackenzie, I am enabled to publish, with his kind permission:—

CASE II.—Chas. E., æt. 8, applied at the Hospital for Diseases of the Throat, July 4, 1861, suffering from hoarseness and dyspnœa of six months' standing. Laryngoscopic examination showed that the left half of the epiglottis was ulcerated away; the ulcerative process still going on; vocal cords thickened; no pharyngeal disease. Before this child was born his mother had twice aborted, and she had scars (syphilitic) in the forehead and in the pharynx. The ulceration of the epiglottis healed at the end of six weeks, but the voice remained hoarse, and the vocal cord slightly thickened.

CASE III.—M., æt. 11, brother of the last patient. On admission was pale and emaciated, having suffered from difficulty in swallowing for the last eight months. The centre of the epiglottis was ulcerated away, and the right side greatly swollen. The patient was restored to comparative health at the end of six weeks, the ulcerative process having entirely ceased.

CASE IV.—F., æt. 8, brought to Dr. M. suffering from sore throat. Ulceration of the edge of the epiglottis and of the central glosso-epiglottic fold. The symptoms had existed for seven months, but rapidly passed away under the iodide of potassium.

CASE V.—M., æt. 13, dysphagia and dyspnœa of five weeks' duration. The epiglottis was œdematous on the left side, and slightly ulcerated. The boy's mother stated that soon after his birth he had been covered with an eruption, and had suffered from sores at the anus. She had suffered from three miscarriages before this child was born. At the end of a week the swelling had subsided, but there still remained some ulceration.

CASE VI.—M., æt. 9, suffers from difficulty in swallowing. The whole of the epiglottis had been already destroyed by ulceration, and there was still a large raw surface. In less than two months the ulcer was completely cured.

In all these cases iodide of potassium internally, and sulphate of copper locally, were administered. In no case were the teeth pegged, or was there any ulceration of the palate. In addition to these Dr. Mackenzie informs me that others have come under his observation, of which he has unfortunately no record. He remembers, however, three or four cases in which the edge of the epiglottis had become adherent to the sides of the pharynx from ulceration of the opposed surfaces.

The following cases came under my care at the clinique of Dr. Mackenzie, to whom I must again acknowledge my indebtedness for the right of publication:—

CASE VII.—Geo. W., æt. 15. Mother has had four premature births and three children at full term. Of these, two died shortly after birth. She is subject to a scurfy eruption on the head which causes her hair to fall out; suffers from pain in the bones at night, and has the scar of a syphilide in the neck. After the birth of this child, had an eruption on the arms and back, which formed scabs, and ultimately "dried up."

Patient healthy at birth—his mother states that his head was unusually large. In the second week of life, began to have screaming fits at night, in which he would burrow his head in the pillow and contract his brows. These fits, which lasted for several weeks, the mother attributes to the large size of his head. When they passed away, he was left without power in the lower extremities, and the muscles of the legs were rigid and contracted. This condition, which precluded the use of his limbs, lasted until he was three years old. He became greatly emaciated, and at the age of ten months, his head broke out in a copious eruption, with which he was affected, off and on, until his second year. From the third to the sixth year, was apparently healthy. During that time had the measles; when six years old, began to complain of sick headache, and pain in the bones, especially in the knee-caps. Later on, had some inflammatory trouble with his eyes, which lasted for a long while. His throat was first affected in Feb. 1879. It became sore, and he had great dysphagia; this grew worse, and his voice became rough and hoarse. The doctor said he had "ulceration of the tonsils." The dysphagia became worse, and his food regurgitated through the nostrils.

Jan. 26, 1880, applied at the hospital, suffering from dysphagia and moderate dyspnœa. His head is very large, and the frontal eminences stand out boldly. The bones of the nose are flattened, and he has linear streaks near the angles of the mouth. The incisor teeth are defective, but not pegged. On looking into the throat, the following condition is discovered: The uvula, arches, and posterior part of the soft palate, destroyed by ulceration; the remaining portion infiltrated with lardaceous material, and greatly thickened; small cicatrices at the posterior part of the hard palate, set in a waxy-looking thickening of its mucous membrane. The normal appearance of the fauces is completely destroyed; on the left side is seen a cicatricial mass (tonsil and anterior pillar), and the posterior pillar is adherent to the lateral wall of the pharynx. On the right side, a large, projecting, pale red, irregular body, fused with the faucial pillars, evidently the hypertrophied, infiltrated tonsil. The back of the pharynx is covered with muco-pus, which gravitates from the naso-pharynx. Upon removing this with the brush, the posterior wall is seen, thickened, infiltrated, and presenting a dirty, yellowish-red appearance. Its follicles are enlarged, prominent, filled with a yellowish secretion, and surrounded by a deep zone of red. A similar condition exists on the right tonsil. On the left side of the hard palate and alveolar ridge, extending from behind the second molar tooth backward to the fauces, and inwards towards the median line of the palatine vault, a large ulcer, of over an inch in diameter, with elevated, callous edges, and a deep, grayish base, circular in outline, and covered with a yellow discharge. The granulations have a pale, unhealthy look, and are very large and protuberant. The mucous membrane surrounding the ulcer is pale, and there is no zone of inflammation. The large size of the tonsil precludes laryngoscopic examination; but the epiglottis can be seen to be swollen, reddened, and slightly œdematous. The cervical glands are hard and swollen. Voice nasal and hoarse; cough and slight muco-purulent expectoration.

Treatment.—Hydrarg. bichlor. gr. $\frac{1}{24}$, and pot. iodid. grs. v., t. i. d.; Iodoform and vapor zinci iodat.

Under these remedies, the ulceration began immediately to heal, and by the fifth of February cicatrization was complete.

All active ulceration having ceased, I excised the tonsil, and was then able to gain a satisfactory view of the interior of the larynx. The epiglottis was greatly thickened, rounded, bent upon itself, and almost motionless; the ary-epiglottic folds and arytenoid cartilages were swollen, and presented an appearance similar to that observed in the epiglottis. The same condition was discovered in the ventricular bands. The left arytenoid was especially swollen, and sluggish in action, and the corresponding ary-epiglottic fold œdematous. No signs of ulceration; no cicatrices. Very slight reddening of cords. Trachea normal. The uniformly thickened laryngeal membrane presented a dull, lustreless, pale-red appearance.

April 19. The hyperæmic condition of the larynx is somewhat diminished in intensity; but the hypertrophy of its membrane remains unaltered. The œdema of the left ary-epiglottic fold has disappeared, and the swelling of the corresponding arytenoid cartilage is reduced considerably.

Case VIII.—Jane L., æt. 12. Mother syphilitic. Healthy, but small, at birth. When three weeks old, had thrush, with "little white blisters" on the tongue, followed by eruption on the genitals and around the anus. At the same time had the snuffles, and a constant greenish, slimy discharge from the bowel. She would cry out in the night, roll her eyes, and was subject to frequent convulsions. The patches on the tongue disappeared in about four weeks; but the other phenomena persisted until her fifth month. From this period to her eighth year, the disease was apparently latent. During this period she had whooping-cough, measles, and chicken-pox. At the age of eight, her right eye became inflamed, and shortly afterwards, the left. She was under treatment at the Royal London Ophthalmic Hospital for two years and a half, before the trouble with the eyes disappeared. During this time she was completely blind for over three months, and the mother states that her eyes were covered with a white cloud. As they were getting better, she became deaf in the right ear, and this condition persists at the present time. With these symptoms, she complained of pain in the bones.

In June, 1879, a little sore appeared on the roof of the mouth just behind the central incisor teeth. This was filled with matter, was yellowish in appearance, and spread rapidly. Her mouth was filled with an offensive, yellow discharge, and she began to cough, and complain of tenderness of the chest on pressure.

Condition on application at the clinic.—Corneæ, especially the left, hazy, and covered with small opacities; irides dull, and expressionless; marked projection of the eyeballs, which the mother states was present at birth, and before the eyes were affected. The eyes are separated by an abnormal interval, and the bridge of the nose is abnormally flattened. In the right anterior naris a small ulcer, with inflamed base, surrounded by a zone of congestion, and covered with yellow secretion; there is a copious discharge from both nostrils. The lower central incisors have a grayish mottled look, and their cutting edges are sharp and serrated. There is only one upper central incisor which has the same appearance as the lower ones, the notched condition, however, being more marked. The anterior half of the hard palate is the seat of a large, irregular, ulcer with bloody borders, and lardaceous base, and bathed in fetid pus. There is necrosis of the palate, and alveolar ridge, and just behind the ulcer of the palate, a small pin-hole perforation, through which a fine probe can be passed to the distance of a quarter of an inch, where it impinges on a roughened surface. The uvula and pillars of the fauces present minute cicatrices, and the posterior wall of the pharynx is thickened and congested.

The mucous membrane of the larynx is uniformly thickened and hyperæmic, and there is blood-red congestion of the right vocal cord. During phonation, the cord moves sluggishly towards the median line. Trachea congested—Cervical glands enlarged.

Treatment as in Case VII.

By the 3d of October, 1879, the ulceration had completely healed, the discharge from the nose was controlled, and the patient left the hospital cured. The thickening of the laryngeal membrane, however, remained unaltered; but its congested condition had disappeared.

More examples may be quoted, but a sufficient number has been adduced to illustrate the propositions set forth in this paper.

Encountering in almost every quarter experience antagonistic to my own, the task has been one of difficulty and embarrassment. I trust, however, that the incomplete manner in which the subject has been treated may at least serve as an introduction to the more careful study of questions replete with interest; and that the positions which have been taken may be sustained by future observation and experience.

Addendum.—Since writing the above, I have been requested by Dr. Barlow to examine the throat of a syphilitic child under his care at the London Hospital. The appearances were typical, and are worthy of mention.

Case IX.—On the upper surface of the tongue, near its base, was a large oval ulcer, with elevated, indurated, sharp, and overhanging edges, and a deep, reddish-yellow base, covered with a foul, purulent discharge. The tongue in its vicinity was inflamed. This had resulted from the breaking down of a large gumma.

The uvula and greater part of the soft palate were destroyed by ulceration, which had extended over the left tonsil, and the corresponding posterior faucial pillar. The ulceration in the latter situation had cicatrized, leaving it partially adherent to the lateral wall of the pharynx. The posterior pharyngeal wall was inflamed, thickened, and tumefied.

The mucous membrane of the entire larynx was uniformly hypertrophied, and presented a dirty yellowish-red appearance. On the rima of the epiglottis were several small spots of apparently incipient ulceration. The vocal cords were swollen, sluggish in action, and the seat of a deep mottled-red congestion.

The mucous membrane of the trachea was intensely hyperæmic.

The child is rapidly recovering under the iodide of potassium.

London, May 1, 1880.

Article II.

Aneurism of the Innominate and Aorta; Ligature of the Carotid and Subclavian Arteries; Death on the Seventh Day.

By Joseph Ransohoff, M.D., F.R.C.S., England, Professor of Anatomy and Clinical Surgery in the Medical College of Ohio, Cincinnati.

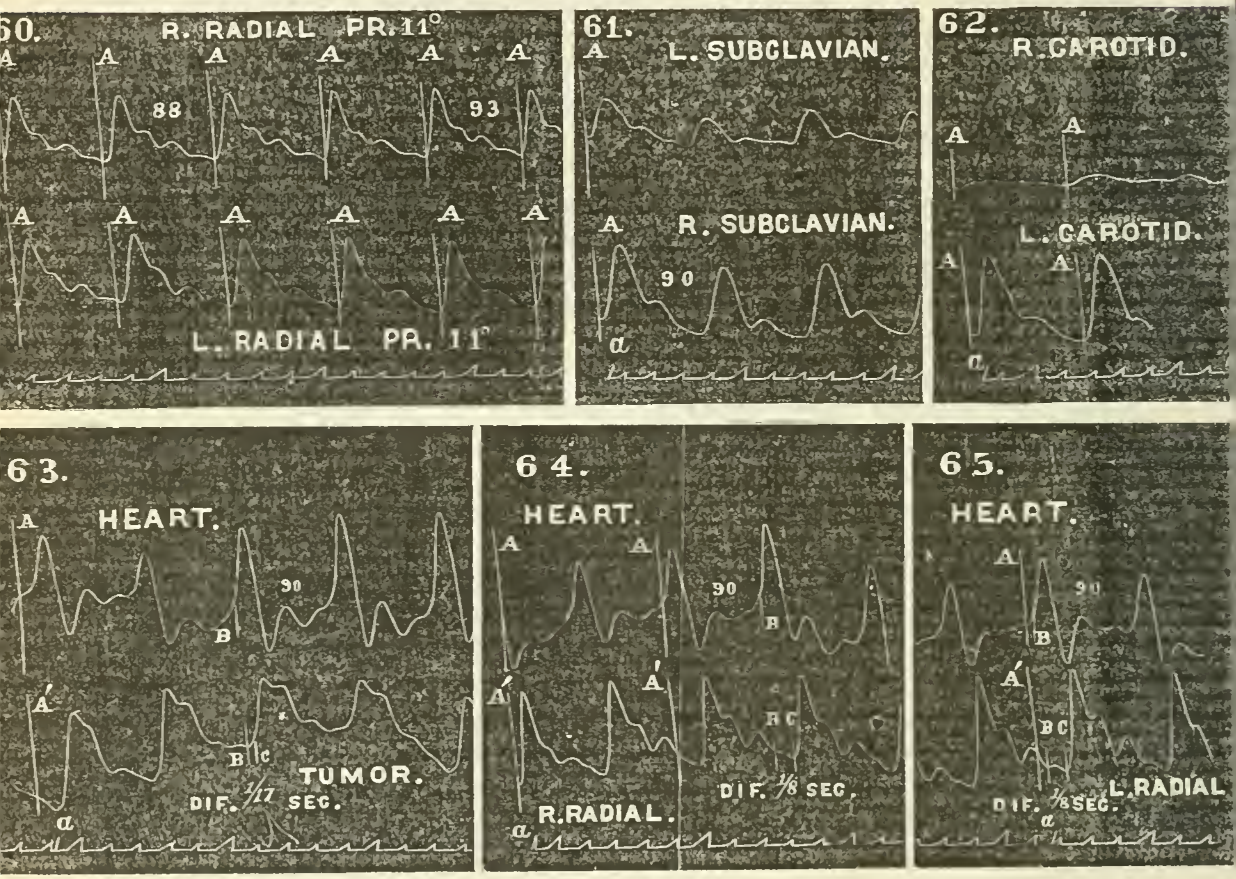
Frank M., æt. 48, single, labourer, native of England, presented himself for consultation on the 20th of December, 1878. Family history good. The patient claims to have observed temperate habits, avoiding alike venereal and alcoholic excesses. States emphatically that he has never been afflicted with syphilis, but admits having had an attack of gonorrhœa attended with rheumatism. Owing to his occupation, exposure to inclemencies of weather were of frequent occurrence, and to the influence of these he ascribes the repeated attacks of rheumatism to which he has been subjected within recent years. He believes the present ailment to be of three years' duration. It made itself manifest by shooting pains in the right arm and shoulder, which, on account of intensity and lancinating character, were supposed to be of neuralgic origin, and treated accordingly. One year ago, a tumour was discovered behind the right sterno-clavicular articulation, projecting into the root of the neck and forming a prominence in the right infra-clavicular region. It was rather firm, and by the physicians in attendance supposed to be an enlarged lymphatic gland. The tumour rapidly enlarged and became pulsatile. Six months prior to consultation a permanent hoarseness supervened, and was attended by violent paroxysms of coughing and dyspnœa, both of which were aggravated by posture on the right side. Within the last year, the gradual loss of strength and progressive emaciation have rendered the undermining of the patient's health apparent to himself and friends.

Present Condition.—Man of average height and good frame; muscles flabby, and adipose tissue sparingly present. Skin sallow, and mucous membranes pale. The haggard face and gray hair give to the patient a more aged appearance than is natural at his years. The right pupil is somewhat contracted, but still responds to light, though not so quickly as the left. During the examination great beads of perspiration accumulate on the face and neck, especially on the right side. Tests with instruments of precision reveal a loss of strength and distinct deterioration of sensibility in the right upper extremity when compared with the left side. Even slight exercise is followed by intense dyspnœa attended with stridulous respiration peculiar to tracheal stenosis. Laryngoscopic inspection demonstrates complete paralysis of the right vocal cord, the glottis remaining patulous even in the phonation of high-pitched vowels. Through the interval between the cords a constriction of the trachea can readily be observed. Prolonged examinations could not be practised on account of the violent spasmodic cough, which seemed to strangle the patient, and disappeared only after the copious expectoration of a white frothy and viscid mucus.

Physical Examination of Chest.—In the right infra-clavicular region, a marked fulness is observed to extend from the median line two and one-half inches outwards and downwards to the border of the second rib. To the touch the tumour is firm and elastic, except in the region of the sterno-clavicular articulation, where it is very soft, and the skin covering it very thin and of bluish tint. The hand placed over the tumour recognized the expansile pulsations almost pathognomonic to aneurisms. Linear measurement between most internal and external points of pulsation $2\frac{1}{2}$ inches. Tape measurement $3\frac{1}{4}$ inches. These pulsations can be felt in the first and second intercostal spaces, and by the introduction of the finger behind the clavicle. A thrill could not be detected at any time. Percussion, in the area referred to, elicited a dull note, which, within, is continuous with that of the heart. The heart is considerably hypertrophied, the apex beat being visible in the sixth intercostal space in the para-sternal line. An aortic systolic murmur is audible; second sound clear, but greatly intensified. Transmitted heart sounds are distinguished over the tumour, where at times a distinct bruit is heard. Lungs resonant, but coarse and fine moist râles are to be detected over the entire chest.

Sphygmographic observations of radial, carotid arteries, and tumour were made by Dr. Keyt, to whom I am indebted for the accompanying tracings, Fig. 1. The pulsations of both radials are well formed and show no departure from a normal type; indeed they are uniform with each other in amplitude, secondary waves, and pressure. Especially is it noticeable that the signal lines are precisely in the same relation to the basal points in both tracings, thus demonstrating the exact synchronism of the right and left radial pulses. Owing to the more superficial position of the right subclavian, its pulsations are more ample than those of the left, though synchronous. The right carotid pulse, compared with the left, is greatly reduced and deformed, yet there is between the pulses no asynchronism. The tumour-trace displays marked undulations produced by respiration; the time difference between the pulsations of the heart and tumour is one-seventeenth of a second, an interval proportioned to the distance to be passed by the blood-wave.

Fig. 1.



During one week the patient was treated with hypodermic injections of ergotin, and observance of absolute rest enjoined. Ice-bags were applied to the tumour constantly for two days. The patient's general condition was not improved by this treatment, and the cough and dyspnœa were gradually becoming more alarming. Under these circumstances the distal simultaneous deligation of the carotid and subclavian arteries was determined upon as affording the patient the only chance of prolonging life.

On account of the apparent implication of the innominate artery along its entire length, the deligation of this vessel near its origin scarcely merited consideration.

Operation, January 2, 1879.—Dr. Forchheimer administered ether to the patient; who, probably on account of the compression of the trachea, was repeatedly in imminent peril from suffocation. The parts having been thoroughly washed, and carbolic acid spray directed to the field of operation, assisted by Drs. Conner, Dawson, and the late Dr. Longworth, I proceeded to ligate the common carotid artery at a point as far removed as possible from the aneurismal tumour, just above the intersection with the omo-hyoid muscle. Although the incision was not over two inches in length, but little difficulty was encountered in exposing the sheath of the vessel, which was opened only to an extent sufficient to permit the passage of the aneurismal needle. After the complete isolation of the artery, the accompanying vein was not seen, a strong carbolized silk ligature was passed around it and tied. According to expectation, from the small pulse in the carotid prior to its deligation, the latter did not affect the pulsations of the tumour. The subclavian was next laid bare in the third portion of its course. The external jugular vein, greatly distended, was encountered and held to one side. Considerable difficulty was experienced in passing the needle around the artery when exposed, on account of the depth of the wound and the close proximity of the aneurismal sac. The ligatures being cut so as to allow one end to escape through the wounds, the latter were closed with catgut sutures, the gauze dressing applied, and the patient removed from the operating table.

Three hours after the operation, feeble and irregular pulsations are perceptible in the right temporal. This speedy return of the pulse must be ascribed to the contracted condition of the carotid before the operation and the collateral circulation dependent thereon. Six hours after operation, the patient complains of headache, and perspires very freely. Temp. 99°; pulse 100.

January 3. Headache disappeared; nausea complained of. Temp. 100°; pulse 120. Ordered tinct. digitalis gtt. xv, every 4 hours.

4th. Pulse 120 and feeble; temp. 100°. Patient passed a restless night on account of severity of cough and copious expectoration. At 11 A. M., a sudden collapse seemed impending, the pulse being scarcely perceptible, extremities cold, face pinched and covered with clammy perspiration. Under free stimulation the condition gradually improved. In the evening first complaints of pain in the chest were made. Digitalis continued; morphia gr. $\frac{1}{4}$ administered hypodermically to relieve suffering. Forty-eight hours after operation the dressing was first removed and was found to be but slightly stained; the wounds seemed to have united in great part by first intention. Temp. 100°. Pulsations of tumour more limited in area and diminished in force. Antiseptic dressings reapplied.

5th. Pulse 120 during the day. Takes nourishment well and seems quite comfortable. In the evening the pain in the chest again returned, necessitating the hypodermic administration of morphia. Physical examination of the chest reveals dulness over the right lung, and large and small moist râles on both sides. The dyspnœa is gradually becoming more alarming.

6th. Pulse 120; temp. 101°. Condition unchanged; alcoholic stimulants ordered.

7th. Pulse 140 and quite feeble; free stimulation strengthened it and reduced the beats to 120. In the evening pain in the lower portion of the chest is complained of, and an inclination to drowsiness is observed in the patient.

8th. General condition worse. Temp. 103°; pulse 140 and very feeble. Patient appears comfortable, but the lividity of the face and beginning stupor indicate the defective oxidation of the blood, and approaching dissolution.

9th. Patient succumbed at 3 A. M. on the seventh day after the operation.

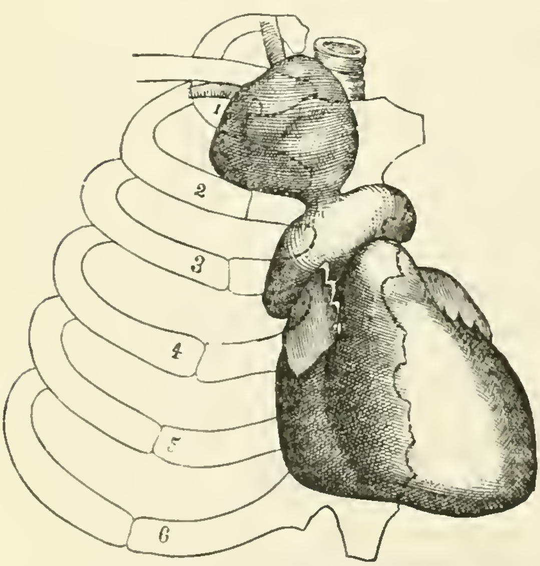
Autopsy.—The incisions over the carotid and subclavian arteries closed in great part by first intention, although deep-seated suppuration around the sheaths, especially that of the subclavian, has taken place. Both vessels filled with firm coagula; vessel walls healthy.

The opening of the thoracic cavity is followed by incomplete collapse of the lungs. The surface of the lungs presents a purplish hue, and is covered in parts by yellow flakes of lymph. Section discloses marked congestion of the lungs, and pressure displaces an abundant frothy, blood-tinged secretion. The lower lobes present the firmest consolidation and entire absence of crepitation; segments sink in water. Position of the heart normal. Measurement across the base 5 inches, axial measurement 5½ inches. Ventricular cavities, especially the right, distended with recent coagula. Wall of the left ventricle measures nearly an inch in thickness. Auriculo-ventricular valves normal; aortic valves slightly expanded and thickened, but competent.

The arch of the aorta is the seat of a fusiform dilatation of which the largest transverse measurement is in the centre of the arch. Circumference of aorta at cardiac orifice 3½ inches. Circumference in the line of greatest dilatation 6 inches. The interior of the aorta presents advanced atheromatous changes, which in many spots have terminated in calcifications.

Adherent to the posterior surface of the sternum and first and second costal cartilages of the right side, a large globular tumour is detected, and found connected with the innominate artery (see Fig. 2). An incision reveals it to be an aneurism springing from the anterior wall of the vessel. Its interior is filled with a large fibrous clot of laminated fibrin, the central portions of which are occupied by a recent coagulum; the external layers of the clot are firmly attached to the walls of the sac. Antero-posterior diameter of the aneurism 2 inches; lateral diameter 2½ inches, longitudinal diameter 3 inches. The aneurismal sac communicates with the calibre of the artery by a large opening which involves the entire anterior wall of the vessel. The walls of the tumour are rather firm with the exception of the superior segment, which projects into the root of the neck. The posterior surfaces of clavicle and sternum are corroded, and the sterno-

Fig. 2.



clavicular articulation is opened. The tumour in its greater growth longitudinally compresses the carotid artery, whereas the aperture of the subclavian, although distorted, is not involved by pressure. The trachea is deflected to the left of the median line, and greatly compressed from before backwards and from right to left. The matting of the tissues in the vicinity of the aneurismal tumour prevents the dissection and display of the nerves involved by compression.

Remarks.—The sphygmographic observations recorded in this case demonstrate with precision that an aneurism of large size may involve an artery without effecting any change in the form or time of the pulse beyond the tumour. This becomes apparent from comparison of the two radial tracings which are alike in form and time, an identity clearly ascribable to the patulous condition of the subclavian. On the other hand, the marked effect which an aneurism may have on the pulse by obstruction is illustrated in the tracing of the right carotid (Fig. 1, 62). The absence of delay in the pulse (shown in Fig. 1, 63, 64, 65) is accounted for by the firmness of the aneurism wall; retardation of the pulse wave occurring usually when the walls of the sac are more or less attenuated, and their elasticity proportionately destroyed.

The difficulties which frequently prevent the recognition of the precise location of an intra-thoracic aneurism, and were enumerated in this case, are consequent upon the advanced condition of the lesion at the time of the examination. A review of statistics reveals the fact that outgrowths from the innominate and aorta are very often confounded, although errors should not occur unless the disease has progressed very far and the aneurism has grown to large dimensions. In the case reported, the dulness of the percussion note of the tumour was continuous with that of the heart within and below. Although from this, it seemed evident that the innominate was involved in its entire length, and the possibility of deligation below the dilatation precluded, no evidence of existing complications in the aorta could be gleaned from the physical signs.

In no other case with which I am acquainted have the symptoms from compression of nerves been so complete as in the one reported, the unilateral perspiration and the paralysis of the right vocal cord clearly indicating compression of the right sympathetic and recurrent laryngeal nerves. When these signs occur on the left side, they almost uniformly are the result, as Traube first demonstrated, of pressure from an aortic aneurism.

It is a singular fact that intra-thoracic aneurisms through compression of the pneumogastric nerve produce a congestion and ultimately a chronic inflammation of the lung closely simulating phthisis. Habershon called attention to this in 1864, and Stokes refers to the frequent coexistence of consumption and aortic aneurism. This condition of the pulmonary structure is in part also attributable to the compression of the larger trachea or bronchi; where it exists, an acute inflammation will readily burst forth after operative interference. The case reported affords an excellent illustration.

According to the statistics of Crisp and Lisfranc, about five per cent. of all aneurisms are connected with the innominate artery. From its very nature and relation to surrounding structures, aneurism of this vessel is a disease which rapidly leads to a fatal issue; hence only a very limited number of spontaneous cures has been reported and weighty authorities even deny the possibility of so favourable a termination. Internal medication and the application of ice to the tumour afford only a remote chance of success. The practice of enforcing complete rest and systematic diet, so successfully employed by Mr. Tufnell in internal aneurisms, should unquestionably be followed by preference in cases which are not desperate and the condition of the patient warrants prolonged confinement and the exhibition of low diet. Where, however, the symptoms arising from compression are of a severity to foreshadow a speedy dissolution, operative interference should not be delayed.

Notwithstanding the first brilliant results obtained by Ciniselli from electro-puncture, but three (?) permanent recoveries have been recorded from its use in the treatment of intra-thoracic aneurism, and the danger of embolism of the cerebral arteries will prevent its repetition. In the last decade of the last century, Vernet, a French military surgeon, first introduced mechanical compression of the arteries beyond the aneurism, but the aggravation of the symptoms which ensued deterred him from further experimentation. In the case of Lyon, after a temporary amelioration of the symptoms, from distal compression, the aneurismal sac opened into the pleural cavity. In most of the cases in which this plan of treatment has been attempted, it seemed to be followed by increase in the volume of the tumour, and increased violence of pulsation.

Experience has already excluded the distal ligation of either carotid or subclavian alone, and even the consecutive deligation of both from the procedures to be followed when the operation is necessitated, since neither plan would stem the blood-stream sufficiently to permit its coagulation, and thorough organization of the clot. The double simultaneous ligature, first performed by Rossi in 1843, while not completely occluding all channels of escape for the blood from the tumour, impedes its circulation to a degree sufficient to permit the clotting which is the first condition of cure. The large coagulum of laminated fibrin adhering to the walls of the sac and completely filling its cavity, clearly demonstrates that in the case reported, so far as the aneurism itself is concerned, a more favourable beginning could not be expected. The small quantity of blood traversing the sac and branches of the subclavian, while sufficient to establish a collateral circulation, will in most cases, and especially in sacculated growths, not interfere with the consolidation of the aneurismal contents. In many cases of innominate aneurism the calibre of the carotid artery is materially diminished, and the question then arises whether the deligation of the artery is to be made, or its complete occlusion entrusted to nature. When the sphygmograph fails to reveal any pulsation of the vessel its occlusion may be considered as established and its deligation as contraindicated. When, upon the other hand, its patulous condition is demonstrable, the artery should be ligated to insure the coagulation of the aneurismal sac, and to avert the dangers of embolism.

This is the twelfth[1] case in which the simultaneous deligation of the carotid and subclavian arteries has been resorted to for the relief of an innominate aneurism. In the statistics of the operation usually cited, Mr. Heath is credited with the first successful result after simultaneous deligation of both vessels. Since the publication of this case in 1865, the patient perished from an independent malady five years after the operation. The aneurism, which was found entirely obliterated, sprang from the aorta without involving the innominate. Maunders' and Sands' case likewise proved to have been aneurisms of the arch of the aorta.

Within the last three years, Mr. Barwell has obtained most remarkable results in four patients on whom he performed the simultaneous distal ligation of carotid and subclavian for innominate aneurism, three recovered, the tumours having become contracted and firmer and the pulsations having ceased. Although the number of operations hitherto reported is too limited for the deduction of permanent conclusions, it is nevertheless exceedingly probable that the operation, especially with antiseptic precautions, will prove a very valuable addition to our resources against an affection which, untreated, runs a speedily fatal course.

ARTICLE III.

PITYRIASIS MACULATA ET CIRCINATA.[2]

By Louis A. Duhring, M.D., Professor of Skin Diseases in the Hospital of the University of Pennsylvania; Dermatologist to the Philadelphia Hospital; and Consulting Physician to the Dispensary for Skin Diseases, Philadelphia.

In the present communication I shall notice a disease of some importance, and also of rarity, examples of which have from time to time been seen by me. It is a disease of considerable importance, for the reason that it may occupy a large area of skin, and consequently occasion alarm to the patient; and, secondly, because it is liable to be confounded with other well-known affections to which it bears close resemblance. It is, moreover, a rare disease, only ten cases having in as many years come to my notice, and by far the greater number of these have been observed within the past two years. As I shall point out later, the disease, although unknown in Germany, England, and this country, finding no place in the literature of these countries, has nevertheless been described in France, but it is only very recently that my attention has been directed to this information. The notes of the cases which I am about to give were made, of course, independent of the articles referred to, and with the idea at the time that the affection had not as yet been described. They were, moreover, taken in each case at the time of the observation, as is my custom in all cases of unusual interest or of rarity.

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[1] In the last issue of this Journal Dr. Lewis A. Stimson reports a case of aneurism of the innominate successfully treated by the double distal deligation.

[2] Read before the American Dermatological Association at its fourth annual meeting, at Newport, R. I., September, 1880.

The first case of which I have any record is that of a working man who was admitted to the Ward for Skin Diseases of the Philadelphia Hospital in November, 1876. The notes transcribed from my private records are as follows:—

Case I.—Dennis T., aged 38, an iron-moulder, admitted to the Philadelphia Hospital November 16, 1876. He is a stout, healthy-looking man. Fifteen years ago he had venereal disease with buboes, but without subsequent signs of syphilis. He has always enjoyed good general health, and has never had any disease of the skin until now. It appeared about five weeks ago. At the time he was working in the country (husking corn), and was in his customary health. He struck his leg against something, which caused him to examine the limb, when, to his surprise, he found several red spots over the tibia of the left leg. They were unaccompanied by any subjective symptoms. The next day he observed similar spots in the same region on the other leg. He describes them as being the size of small split peas, slightly raised, flat, smooth, and dark red. There were about a dozen of them in number. The rest of the skin was healthy. On the third day no new developments were noticed, but on the fourth day he experienced on the left arm slight itching, and on examination discovered on the extensor surface of the left arm, from the shoulder to the middle of the forearm, large pin-head sized, slightly elevated, dark-red spots. The following night he felt some itching on the right arm and on the back, but not enough to cause him to scratch, and in the morning noted that similar lesions to those on the legs and arm, were here present. They increased very rapidly, and in the course of two days they occupied the whole of the back, the buttocks, and the thighs. At the end of the third or the fourth day he remembers that they were less itchy, and that they then began to increase in size and to become slightly scaly, and were in about the same state as now. They remained in this condition for a fortnight, when he experienced painful swelling of the legs, from the calves to the ankles, which he had never before had. For the last three weeks there has been absolutely no itching of the eruption. It has become pale in colour, and more scaly, the scaliness becoming more marked from week to week. No new lesions have appeared since the first week of the attack. The general health remained fair during the first week, but afterwards he became subject to chilliness, and was unable to stand the cold. About the end of the first week, moreover, after the eruption had all appeared, his appetite began to fail, and it has not yet returned. He also suffered much headache, which has gradually subsided. He states that the chilliness referred to has been uninterruptedly present, accompanied with night sweats, but with no debility nor with pains. The bowels have been irregular.

Present Condition.—The eruption begins at the back of the neck and extends downwards over the back in the form of an almost solid sheet, and over the shoulders and extensor surfaces of the arms to the middle of the forearms. With the exception of a few faint lesions over the sternal region, the front part of neck, clavicular region, axillæ, chest, and abdomen are free; and, excepting a few spots on the flexor surface of the left forearm, the flexor surfaces of the arms and forearms have also escaped. The disease comes around from the back and includes the sides of the thorax, and so finds its way downwards over the buttocks, both surfaces of the thighs and legs to ankles. The extensor surfaces are much more markedly affected than the flexor surfaces. The genitalia remain free.

The disease is characterized by pin-head, split-pea, and finger-nail sized, superficially scaled, reddish spots, having a dull or dark pinkish tint, covered with thin, scanty, whitish, flaky, papery scales, similar to those encountered in tinea circinata. They are very slightly raised above the surrounding surface; are irregular in outline, some being circular, others somewhat angular; and, where numerous, show a disposition to coalesce, with the result on the back of the formation of a large, erythematous, irregularly-shaped patch. The lesions are profuse, especially on the back and on the thighs. A placebo was ordered internally, and no external treatment. No diagnosis was made.

Jan. 10, 1877. The patient has been under constant observation, and has had no treatment. The scales were examined with much care with the microscope for fungus, but none was found. The lesions have very gradually become paler during the month; so gradually, however, that the change has been perceptible only from week to week. The desquamation also has decreased, and now is almost unworthy of mention. There have been no subjective symptoms. Considerable pigmentation has been taking place as the lesions have faded, which is still going on, giving the spots a dusky, yellowish, tawny hue. The legs have become the seat of large, somewhat thickened, erythematous, scaly patches, closely resembling squamous eczema, formed by the coalition of numerous lesions. The general health is now good.

25th. The eruption has faded much more rapidly of late, and the scaling and pigmentation are also disappearing, leaving faint, dusky-pink, mottled spots.

Remarks.—The patient remained in the hospital for another week, when he was discharged with but the faintest trace of the disease in the form of dusky pigmentary stains. His recovery during the last fortnight was remarkably rapid. The case was under observation about two months, and during this period was the subject of much speculation as to its nature and its relation to other well-known forms of skin disease. At the date of his admission to the hospital the process was at its height, according to his own statement and the subsequent course. After several careful examinations, and the lapse of a few weeks, the conclusion arrived at was that the disease was entirely new to me, and that, so far as my knowledge in literature extended, it was a form of disease that had not been described.

Its syphilitic nature was not for a moment entertained, though it possessed somewhat the colour of the fading erythematous syphiloderm, and had a singularly slow course, and was unattended by subjective symptoms. It also bore some resemblance to superficial psoriasis guttata and circinata, but far more likeness to both tinea circinata and tinea versicolor, especially the former. Its parasitic nature was immediately strongly suspected, and careful microscopic examinations were made by myself on repeated occasions, without, however, discovering any fungus.

No treatment was employed during the entire course of the process, spontaneous recovery taking place in about three months from the beginning. For some weeks the disease was at a standstill, when without apparent cause it began very gradually to become paler, and so, for a while, by slow degrees faded, and then towards the close rapidly passed away.

The second case was that of a married lady, the wife of a physician, about 30 years of age, whom I was asked to see in consultation with Dr. Charles H. Thomas, of this city, on Nov. 7, 1876.

Case II.—Mrs. ——, æt. 30, a lady in the upper walks of life, of rather slight frame, though well nourished, with light hair, blue eyes, and fair complexion. She has always heretofore enjoyed excellent health, and has never had any disease of the skin. The present eruption made its appearance about a fortnight ago, without fever or other premonitory symptoms. She awoke in the morning and found the lesions upon the chest and over the trunk generally. They neither itched nor burned. Indeed, had she not seen them, she would not have been aware of their presence. In the course of two days they were as numerous and as well developed as now, and looked about the same then as at the present time. The disease, as stated, has existed about two weeks, and is characterized by numerous, discrete, small patches or spots, which are of the nature of erythematous, slight desquamative macules. They are roundish in form, but are somewhat irregular and ill-defined in outline. These vary in size from a pinhead to a split-pea and large finger-nail. The majority are of the size of a five-cent silver piece. They are all of a reddish colour, which may be further described as being a faded rose-red or a deep dusky-pink with a tawny, yellowish cast. They have, therefore, not an acute, but a dull, dusky look. They are the seat of slight desquamation in the form of a thin, delicate adherent scale, or a layer of partially loose, shrivelled epidermis. The scaliness is so insignificant that the epithelium is neither cast off readily nor can it be scraped off without difficulty. This feature may be compared to that encountered in tinea circinata. The lesions have the appearance, however, that they may soon become distinctly squamous. They are on a level with the surrounding skin, and possess no border, nor, indeed, any defined outline. Passing the hand over the skin, they are noted to be dry and somewhat harsh, and the epidermis to be slightly wrinkled. In the larger lesions, owing to this shrivelled condition of the epidermis, there is a slight, scarcely perceptible depression, due to contraction and puckering of the epithelium. Upon pressure, they do not disappear completely, less so, for example, than in the case of a similar lesion of psoriasis. They are, nevertheless, remarkable for being superficially seated, involving, evidently, only the upper layers of the skin, and resemble, not only in this respect but also in general appearance, the macules of the erythematous syphiloderm. The process is evidently a hyperæmia, and not a true inflammation.

The eruption is profuse, and occupies the following regions. The scalp and face are free. It begins about the upper part of the neck, and passes downwards over the back and over the chest, involving the breasts and abdomen, and so on downwards over the hips, buttocks, and thighs to the knees. The arms and legs are also affected, but not so much so as the other regions named. The forearms and the backs of the hands are only slightly invaded. The fingers, palms, and soles remain unaffected. The lesions are symmetrical and quite uniformly distributed, and show no disposition to group, nor to be more pronounced in one locality than another, though perhaps a better idea of their character can be obtained from those on the chest and breasts than elsewhere. They all appear to be in about the same stage of evolution; no new ones are observed, nor, on the other hand, do any seem to be disappearing. Their colour is paler on the extremities than on the trunk. Upon this latter region they are profuse, every square line of the surface seeming to be occupied by them. They remain, however, discrete. There is little or no itching, nor have there been at any time any subjective symptoms.

The affection bears more resemblance to an extensive case of disseminated small-spotted tinea versicolor than to any other disease. As has been stated, it also resembles the erythematous syphiloderm, and also rötheln. No treatment was instituted, and no diagnosis was made.

Nov. 11, 1876. A careful examination of the scales failed to discover any sign of fungus, which was suspected. Four days have elapsed, and no change has taken place except that there has been slight itching and that the eruption is somewhat paler. No new lesions. Upon further examination of the regions invaded, the lower part of the back and buttocks show larger lesions than elsewhere, and in a more crowded state, but nowhere are they confluent. The general health is good.

Jan. 10, 1877. Four weeks have elapsed since I last saw the patient, during which period the eruption completely disappeared. Immediately after the last note the disease became worse, the lesions becoming more highly coloured, scaly, and irritable, and smarted, but they were not itchy. Oil of sweet almonds was now used as an external application, and at once gave ease. In a few days decided improvement was noted, and in a fortnight the lesions disappeared, leaving slight pigmentation. The patient complained that she felt perfectly well during the period that the eruption existed, but that as it began to fade she experienced decided malaise.

Remarks.—A peculiarity of the lesions in this case is that they manifested no disposition to coalesce, but remained discrete, though in certain regions, as the back and buttocks, they were greatly crowded. The majority, moreover, were of a uniform size, which gave the skin a distinctly spotted appearance. The desquamation was lighter than in the first case, and could scarcely be called a prominent feature. The lesions were rather ill-defined, dry, erythematous macules, evincing no inclination to undergo enlargement nor change of any kind. The sudden appearance of the lesions here is also worthy of remark, all of them having been developed to their full proportion within two or three days.

The diagnosis, as in the first case (which was under observation at the same time), was difficult. The resemblance to an old, irritated tinea versicolor was striking, though its occurrence on the thighs and legs was at variance with the course of this disease. It was not until several careful microscopic examinations had been made that I was willing to abandon the idea of its parasitic nature. The sudden invasion of the disease, and the remarkably rapid development of the lesions, were, of course, among the strongest arguments against its probable parasitic nature. The likeness, too, to the erythematous syphiloderm, and to the exanthem rötheln, was marked, more so even than in Case I., and only after attentive study were these diseases excluded by Dr. Thomas and myself. As in Case I., there was no treatment instituted, except one or two inunctions of oil of sweet almonds, which were employed towards the close of the process, and which I cannot think were of any positive value in hastening the cure. Before they were used the disease had already begun to undergo spontaneous involution. No internal treatment at any time was taken.

The following case was sent to me for an opinion by Dr. Charles Carter, at that time Physician-in-Charge of the Northern Dispensary, and is remarkable for the widespread extent of the disease.

CASE III.—J. S., a large, strong-looking man, about thirty years of age, who states that he has always heretofore enjoyed good general health, and that he has never had any skin disease before. He is a blacksmith by occupation, and is at the present time working in the gas-works, where he is exposed to a very high temperature, and is consequently in a constant state of excessive perspiration. He complains of feeling weak. The disease of the skin made its appearance gradually, having been first noticed about six weeks ago. It originally appeared in the form of "spots" upon the lateral portions of the thorax, and spread thence down the sides of the trunk. Later it invaded the arms and forearms, thighs and legs. Its chief force, however, seemed to be expended upon the trunk. No change is said to have occurred in the general features of the eruption during the last three weeks, it being, in his opinion, during this period at a stand-still.

Upon examination, I find a most extensive disease of the skin involving the neck, the whole of the trunk, buttocks, groins, genitals, thighs and legs, and the arms and forearms. The only regions which have escaped are the scalp, face, hands, and feet. From the neck downwards, over the whole of the trunk and the thighs, the eruption is profuse, and constitutes a diffuse, almost solid sheet. The axillæ, arms, and forearms as far as the wrists, are similarly invaded, though from the elbows to the wrists the uniformly diseased surface is broken up by small patches of sound skin. The legs are affected in this respect like the forearms. The eruption is of an inflammatory character, consisting over the trunk of a diffuse, uniform, continuous sheet of erythema, or of an erythematous inflammation, with but slight infiltration. The skin is smooth, moist with perspiration, and feels less supple than normal and slightly thickened. The colour is a uniform tawny, dusky, dull, faintly violaceous red, which he states is brighter or duller as he happens to be at rest or at work. No scales can be detected, though by rubbing the fingers over the surface small rolls of epidermis may collected, as in the case of an extensive tinea versicolor when bathed in perspiration, though to a much less extent. Over the back the eruption is less distinctly marked, and is paler in colour. Upon the arms it is continuous with that of the trunk, and extends to below the elbows as a solid sheet. Over the forearms the outline is broken and marked by variously sized, mostly small, split-pea sized, circumscribed, flat papular patches, which become fewer towards the hands. The same description answers for the legs. The eruption is symmetrical. Over the entire affected skin there is a decided tendency to a brownish-yellow pigmentation, which, incorporated with the red, gives the dusky, tawny tint referred to. He complains only of slight itching, except when at work, when it is severe.

Remarks.—I was quite at a loss to make the diagnosis in this case, and in the mean time directed the patient to leave off his violent work for a week, and requested him to return to me at the end of that time for further examination. Microscopic examination of scraped epidermis failed to show any signs of fungus. At the end of a week he again presented himself, somewhat improved, stating that he had rested himself and had kept as free from perspiration as possible. I found that no change had occurred in the general appearance of the disease, except that the red colour was paler. On the other hand, the brownish pigmentation was of a deeper tint, and the skin more mottled. A tonic aperient was ordered and general directions for diet and hygiene given. I saw him once again, a week or ten days later, when no marked change had taken place, after which he passed from my observation.

The disease here invaded the greater part of the cutaneous surface, and was indeed almost universal, and as I look back upon the case and its history, there seems to me to be little doubt that the wide-spread extent of the disease was largely due to the excessively high temperature that the patient was almost continuously exposed to. I have forgotten the number of the degrees, but it was so high that his co-laborers not infrequently succumbed to the heat. The perspiration which took place he stated was excessive, and large draughts of water were continually indulged in. Even when I saw him after a half day's rest he was bathed with moisture, and was still sweating freely. This circumstance, moreover, I have no doubt interfered in a measure with the natural course of the disease, and offers an explanation for the absence of desquamation. There were no circinate lesions, and the few discrete ones that existed on the extremities were small and maculo-papular in character. The lesions, therefore, were of a macular type, and over the greater portion of the surface were so confluent as to constitute a uniform, solid sheet of disease, such as is sometimes met with in lichen ruber. This disease, indeed, suggested itself to me in the matter of diagnosis, but the history as well as other points at once excluded it from the list of probable diseases. Tinea versicolor also came to my mind, although I could scarcely conceive of this disease assuming such proportions; the brief length of time of its existence, and later the microscope dispelled the idea. Other inflammatory diseases, occasionally involving large surfaces, such as erythematous eczema, pityriasis rubra, psoriasis, and dermatitis exfoliativa, did not occur to me, and need be mentioned here only to be dismissed, for the symptoms had no positive likeness to any of these diseases.

Of the next case which presented itself I shall give only a brief account, for the reason that it differs in no way from another case which has occurred more recently, and which I shall describe in detail. The patient was a young milkman, who presented himself to me on Nov. 13, 1878.

Case IV.—Hugh S., æt. 22, a spare, consumptive-looking person, with light hair. He states that his general health is equal to the average, and that he never had any disease of the skin before. It began six weeks ago in the form of small "ringworm-like spots," occupying the abdomen, sides of the thorax, and thighs. The lesions grew rapidly, and soon attained their present proportions. He is unable to give any further account of their development, as inasmuch as they gave him but little annoyance he seldom inspected himself. He had been told they were ringworm, and that they would in time disappear, but as lately they had increased in size and were rapidly invading new regions, and had moreover resisted sulphur ointment, used as a parasiticide, he had sought further advice.

The disease occupies the sides of the thorax, the chest, from the clavicular region down, the abdomen, groins, and the thighs as far as the knees. It is symmetrical. It consists of a large number of both discrete and confluent, circular or ovalish, more or less annular, slightly scaly, dull reddish, erythematous patches having a pale, dusky-yellowish tinge. The colour is uniform, being nowhere patchy. Over the upper part of the trunk the lesions are confluent, and form a solid sheet of eruption, completely encasing the regions, in the manner sometimes seen in extensively developed tinea versicolor. The disease on these patches is slightly scaly, the scales being small and mealy or branny in character, resembling also the desquamation of tinea versicolor. Passing the hand over the surface the skin is not noticed to be harsh, nor to be in any way markedly altered. It is but very little thickened, and is quite supple.

About the abdomen, groins, and upper third of thighs distinctly defined, more or less circular and ovalish lesions exist, some of which the patient states are recent. They resemble in general appearance the well-known lesions of tinea circinata, having a marked reddish border with a pale-red, slightly scaly, central area, the disease having the look of spreading on the periphery and of clearing in the centre. These lesions are of variable size, some being as large as a silver quarter dollar, others, ovalish in shape, of the size and shape of pecan-nuts or olives. Here and there they are confluent, though they do not coalesce unless overcrowded. The patient complains of some itching and heat of skin, owing, doubtless, to the free use of sulphur ointment which he has just applied. Before this application there was no itching. A plain starch dusting powder was ordered, and internally a magnesia aperient.

December 9th. The disease during the past month has decreased in extent and in severity, and has cleared away at many points, but new circinate lesions have made their appearance on the thighs, which now resemble eczema squamosum more than tinea circinata. The older ones, however, still bear a strong likeness to the last-named disease. Petroleum ointment and calomel, a half drachm to the ounce, was ordered.

March 1, 1879. The patient informs me that shortly after his last visit the disease began to become perceptibly paler, and more scaly, and that it then began to clear away rapidly here and there, until, at the end of a month, the skin was normal though slightly discoloured and tawny. At the present writing his skin is healthy, showing no trace of the former affection. It has been so for four or five weeks. The general health of the patient remained good throughout the entire course of the disease

The next case presents the disease in still another form, though really differing from the others, I think, only in the degree of development. But the lesions were so different, as to size and shape, that at first I was slow in recognizing the affection. The patient was a young man who presented himself for advice at the department for skin diseases of the Hospital of the University of Pennsylvania.

CASE V.—Henry G., 27 years of age, a porter by occupation. His family history has no bearings on the disease. He has always enjoyed fair health, but has suffered for several years from dyspepsia and constipation. He has never, to the present attack, suffered from any kind of skin disease excepting an affection which was called at the time (twelve years ago), the "itch" and which was cured.

His present disease is of three weeks' duration. For some weeks previously he had been performing unusually heavy work in a warm atmosphere, and was during this time almost constantly in a state of more or less profuse perspiration. His attention was first called to it by an attack of itching, confined to the axillæ, which came on one evening as he was undressing himself. On examining the arm-pits he found a number of raised dry lesions, of a reddish colour, and which burned and itched.

Throughout the night these symptoms continued at intervals. While dressing in the morning they seemed almost intolerable, but when once dressed and at work the annoyance ceased and he quite forgot the existence of the eruption. A few days later while changing his clothing he experienced some irritation in the skin on both sides of the trunk, and thrusting his hand under the flannel shirt, which he wore next the skin, he rubbed and scratched himself vigorously. As this seemed to aggravate the symptoms, he took off his shirt, and, to his surprise, found that the eruption had extended from the axillæ down along the lateral portions of the trunk, reaching as far as the crest of the ilia, and was beginning to extend over the abdomen.

It spread slowly until the sides of the hips as low as the trochanter, together with the groins, pubes, and, to a slight extent, the perineum, became involved. Within the last few days the affection has made more rapid progress, involving the upper part of the thigh in a single isolated patch. The itching and burning have become steadily worse, until now he cannot rest at night. Such was the history given.

On examination I find the eruption to be limited almost exclusively to the lateral portions of the trunk and to the lower part of the abdomen and to the groins. Beginning in the axillæ on either side, it extends symmetrically down both sides of the trunk, becoming gradually more marked until the crests of the ilia are reached, where the eruption is at its maximum, and then turning inward to involve the inguinal regions with the upper and inner parts of the thigh and the pubic and lower abdominal regions.

Small patches of eruption exist on either arm in the flexor surface of the elbow, and a recent patch has shown itself upon the posterior aspect of the thigh. No other areas of actual disease can be observed, but the integument generally is in an irritable condition, as is shown by the occurrence of cutis anserina on the least exposure, as well as the tendency to the formation of urticaria-like elevations about the papules when these are rubbed, and ready flushing of the skin when any part is lightly chafed with the hand.

Viewed as a whole, the eruption is seen to consist of very numerous, variously sized, from pin-head to pea-sized, maculo-papules of a bright or dusky red colour, widely scattered or grouped in disorder, coalescing frequently to form patches which often present an indistinctly circinate form, the centre being occupied by a patch of dirty-yellowish, brownish pigmented, smooth or slightly scaly skin. When the hand is passed over the surface, a slight nutmeg-grater sensation is felt. The initial lesion, and the one which is by far the most numerous, is a minute pin-point to large pin-head sized, bright-red, maculo-papule, sharply defined, without areola, and losing colour under pressure. .Occasionally a minute quasi-vesicular point may be noted on the apex of a discrete papule which then most closely resembles the lesion of ordinary miliaria rubra. More frequently the lesion retains the papular form and is joined by others, the patch growing larger and larger, the individual papules becoming flattened and merging to form a patch. In the older lesions the centre of this patch becomes absorbed, sinking to a level with the surrounding integument, and forming an area of pigmented skin, around the edges of which new, often discrete, papular lesions can be seen.

The lesions appear to be unconnected with the hair follicles. Sweating increases the activity of the eruption, which then itches intensely. The single lesions and the smaller patches are not markedly scaly, but the larger patches have a few light, fine, grayish scales upon their surface.

The patient's general condition shows signs of disturbance of the bodily functions generally and particularly of the digestion. He sweats freely, and has suffered a good deal with headache until the last few days, and now experiences frequent sensations of chilliness. His appetite is poor and is capricious; he craves various articles of diet. He suffers occasional nausea but has never vomited. His bowels are constipated. He is low-spirited, pale, and rather haggard, and feels weak. A fortnight later all trace of the disease had disappeared, leaving the skin in a natural state. Microscopic examination failed to reveal any vegetable parasite.

Remarks.—The peculiarity of this case is the fact that many of the lesions assumed a distinctly maculo-papular form, the greater number retaining this form throughout their evolution. Only here and there did they coalesce, and in no instance to the extent of constituting large patches as in the other cases reported. It is true they were only slightly elevated, but they were nevertheless fully entitled to be designated maculo-papules, being pin-head to split-pea sized, sharply circumscribed, moderately firm, and inflammatory.

I can describe their appearance no better perhaps than by stating that they resembled certain forms of papular eczema where the lesions are flat rather than acuminated. They also resembled somewhat the first stage of lichen ruber planus. On account of the papular form, the resemblance to tinea circinata was not striking, though the few circinate lesions were so suggestive as to cause a careful microscopic examination to be made. Nor, for the same reason, was there any ground for thinking the disease to be a form of tinea versicolor. As stated in the notes, the patient was in excessive perspiration from over-exertion and debility on both occasions when I examined him, especially so in the first instance, which would, of course, account for the absence of desquamation. On the second occasion his skin was also somewhat moist, though, as stated, furfuraceous scaling was then observed. The lesions, moreover, being mostly discrete and small, marked desquamation would scarcely have taken place under any circumstances. The next point of interest is the rapid course of the disease, entirely uninfluenced by treatment, whether internal or local. The lesions were of three weeks' standing when I first saw them, and were then already undergoing involution. A fortnight later the process had terminated in recovery, the improvement during the last week having taken place rapidly.

The following case was sent to me for an opinion by my friend, Dr. Elliott Richardson, of this city, who subsequently kindly gave me the opportunity of seeing the patient from time to time until complete recovery took place. The date at which this case came under observation was Feb. 10, 1879:—

Case VI.—Mrs. Catherine E., æt. 48, married, a large, fleshy woman, accustomed to washing and to heavy work in general. She relates that though stout and apparently in good health at the present time, she is in reality weakly and unwell. Her appetite is capricious, being ravenous at times and on other days without any desire for food. She has for years been subject to prickly heat during the summer, but has never had it in winter, though she ordinarily perspires freely throughout the entire year.

The present skin disease is the first affection of the skin she has ever experienced. It is of four weeks' duration, and manifested itself on the breasts in the form of a distinct ring about the size of a five-cent silver coin; at the same time she remembers that there were three or four small papules in the flexure of the left arm. A few days later, both rings and papules appeared over the sides of the trunk and elsewhere, accompanied by decided itching from the beginning. The eruption spread with rapidity, only two weeks elapsing before it was at its height and had invaded all the regions now involved. For the past fortnight it has been at a standstill. It has at no time been more inflammatory than now, nor, indeed, in any way different.

It consists of a profuse eruption made up of solid erythematous patches, and rings with clear centres, and of numerous, crowded and confluent, variously sized, flat, slightly raised maculo-papules. The patches consist of variously sized, mostly large, hand-sized and larger, areas of erythema, of a mottled red colour, the seat of furfuraceous desquamation. The annular lesions, or rings referred to, are also numerous and conspicuous. They vary in size from a silver five-cent piece to a quarter dollar, some being even larger, the majority, however, being of the size of five and ten-cent silver coins. They are circular or ovalish in outline, but where two or more have run together, irregular forms result, which in some cases have a diameter of several inches. They possess a slightly raised, defined, reddish border, with a paler, discoloured, or mottled, decidedly scaly centre, the scales being fine and mealy or branny, as in tinea versicolor; in some cases they are coarser and then resemble the scales of tinea circinata. The maculo-papular lesions spoken of are of various size and shape, some being pin-head sized, others as large as split peas, while in shape they are roundish or more or less irregular or even angular. The smaller ones resemble the papules of prickly heat, and it is this affection that the patient thinks she is suffering from. They are flat or rounded, and are slightly raised, but are not so firm as in papular eczema. On the contrary, they can barely be detected in passing the hand over the surface; still, they have the appearance of being plastic. They are bright red in colour, are smooth, and are without scale.

The following regions are invaded. The disease begins at the nape of the neck, and extends down over the whole of the back, over the buttocks, hips, and thighs to the knees. In front it begins about the clavicles and spreads over the shoulders and arms, and invades the axillæ, sides of the thorax, mammæ, and abdomen and groins; the regions of the umbilicus and pubes alone escaping. The whole trunk may therefore be said to be involved, and over most reigns in the form of a solid sheet of eruption. It is symmetrical, neither side being favoured. The rest of the general surface is free.

Over the upper part of the back, the disease is in the form of large solid patches, terminating above the shoulders with a sharp somewhat angular line of demarcation, but below, the border is ill defined with out-lying smaller patches and discrete papules; about the region of the spinal column and over the lumbar region, the lesions are mostly small and papular in character. Upon the sides of the thorax and over the chest solid patches are encountered. Over the breast they are maculo-papular, and in small areas the size of a split pea and finger nail, some of which are discrete, others confluent. The abdomen is the seat of large hand-sized, more or less broken-up patches, irregular in outline, and altogether ill defined.

In the groins and on the thighs distinct, circular or ovalish, annular lesions are met with, resembling precisely in appearance tinea circinata occupying these regions. The larger rings are plainly formed by the coalition of two or more smaller ones. In the groins, in the axillæ, and beneath the mammæ, which are pendulous, the skin is red and slightly macerated, constituting slight erythema-intertrigo, but nowhere are there signs of eczema.

The various lesions appear to be in different stages of development. Old and new spots are seen side by side, and solid patches, rings, and papules occur likewise in close proximity to one another. It is evident that these various forms, namely, macules, papules, rings and extensive patches, are, in many instances, but stages of one another, the maculo-papules being the first stage; the circinate, more or less annular lesions, the second stage; and the larger solid patches the last stage. As stated, the smallest lesions are smooth and free of scale, but the rings, even the smaller ones, show generally decided dryness and desquamation, and a tawny, dusky, yellowish hue, which reminds one of the colour of tinea versicolor. They are, moreover, more scaly on the periphery than in the centre. The patient complains of considerable itching and of pricking sensations, reminding her of her experience in former attacks of prickly heat.

March 2. During the past fortnight the disease has been gradually becoming paler, and in some localities has shown signs of clearing away. Upon the breasts, the regions where it first appeared, it is much mottled and broken up, and is pale, tawny, and decidedly scaly. It is everywhere less itchy. No new lesions have appeared.

10th. The process of involution has been going on rapidly. The eruption has faded perceptibly within the week, and is now of a pale dusky pink or violaceous colour, with a distinctly marked brownish-yellow tinge pervading the whole, giving the skin a dingy, soiled look. It is, moreover, the seat of a marked furfuraceous desquamation. The itching has entirely ceased.

April 1. The redness has disappeared, but there still remains a general, mottled, pale brownish-yellow, tawny pigmentation, which, however, is gradually fading. The desquamation ceased a week or longer ago.

23d. The skin has regained its natural appearance, and the patient is discharged from further observation.

I have thus in the six cases presented described a disease which has caused me much embarrassment, especially in the earlier cases which came under observation. It is, moreover, an affection which I have no hesitation in stating merits careful study and further investigation. Notes of the six examples reported seem to me quite sufficient for the purpose of portraying the chief characters of the disease and enabling one to recognize the lesions. I may, however, add that four additional cases of the disease have, within the year or past eighteen months, come to my notice, in all of which the main symptoms were well displayed. From these observations, I think it may be stated that the process is a clearly defined one as regards its clinical features, which are very similar in all cases. Not only are the lesions alike, as concerns colour, form, size, and general characteristics, but the regions involved, and the course and evolution of the disease are also almost the same in each instance. The disease appears to me to be a well-marked process, and to be as distinct from other diseases as it is possible to imagine. I cannot believe that it is a form or an undescribed variety of any of the well-known dermatoses.

The disease has, as far as my knowledge extends, never been described in this country, nor have I ever encountered in our literature reports of peculiar cases of skin disease which it occurs to me could be considered as the same affection. No more do we find any description or mention of such a disease in any of the English works on dermatology, whether of old or of recent publication, nor in any of the many treatises on the subject which have been issued from the German press. It is, indeed, singular that such a well-defined disease should have escaped the notice of both English and German observers. From my knowledge of the process, I do not think it possible that it could be regarded as other than a distinctive affection by such acute observers as now occupy the dermatological field in England and in Germany. To the French, however, belongs the honour of having first described the disease, though, as it appears to me, rather imperfectly, and it is on this account, I think, that their writings on this disease have not attracted much attention even in their own country. It is only quite recently—since, indeed, I began to prepare this communication—that I became aware that the disease had been described in France. While, therefore, the question of priority in the description does not concern the writer, I may be permitted to state that the disease has been familiar to me for some years, and that the notes here given were recorded at the date of each observation, and therefore prior to my acquaintance with French writings on the subject.

Bazin, in his work on "Les Affections Génériques de la Peau,"[1] considers the subject of pityriasis at length, defining it to mean "a disease of the skin in process of evolution, characterized during its period of existence by fine, dry, furfuraceous or foliaceous scales seated upon the tegumentary surface without appreciable elevation above the surrounding parts, covering a more or less considerable area, with or without change in the colour of the skin." He divides pityriasis into two forms, one due to external causes, as from the razor and from the parasite microsporon furfur, and the other to internal causes, of which he makes two varieties, namely, "pityriasis arthritique" and "pityriasis herpetique." Under the head of the former we find "pityriasis rubra aigu" with the two varieties "maculata et circinata." There are other points of refinement in classification given, which, however, need not be mentioned here, for my chief object in quoting the views of this eminent French author is to show that he was entirely familiar with the clinical features of the disease in question, as will be readily admitted from the following description. Pityriasis rubra aigu, he proceeds to say, is an affection characterized by red macules, disseminated and small, forming sometimes by their coalition large patches, covered with grayish or whitish furfuraceous scales, and terminating by resolution in the course of from two to four weeks. The prodromata consist of malaise, anorexia, and a more or less marked febrile state. In addition the eruption is accompanied by tolerably severe itching.

According to the aspect of the eruption, Bazin makes two varieties, pityriasis maculata and pityriasis circinata. The first of these (which, according to this writer, is the same disease as the pityriasis rosea of Gibert) is characterized by

> "pale red macules, small and disseminated, non-elevated, and more or less rounded, with sinuous outlines. In the second variety, pityriasis circinata, the eruption manifests itself in the form of small, disseminated, red macules, resem-

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[1] Paris, 1862, p. 331.

bling those of psoriasis guttata. They soon unite and constitute circles more or less complete, which resemble those of tinea circinata (l'herpes circiné); or they form linear bands and semicircles, which call to mind psoriasis (lèpre valgaire).

"Nevertheless, pityriasis rubra circinata differs in the absence of elevation from that which pertains to both psoriasis and tinea circinata. In the beginning, the macules are the seat of a slightly lamellar exfoliation, which later becomes furfuraceous. In both varieties the general symptoms cease with the development of the eruption, but the itching persists throughout the entire course of the disease. Often it is so intense as to cause scratching, under the influence of which a transitory eczematous desquamation takes place. The disease ordinarily develops upon the face, scalp, and, above all, on the trunk; sometimes also it is encountered on the limbs, notably on the forearms and on the lower part of the legs. The affection varies in its course and duration. It disappears sometimes in from ten to fifteen days; in other cases it continues for a month or five weeks by successive outbreaks. But it ends always by resolution, never passing into a chronic state. It is observed principally in youth. Cold, irregularities of diet, and the suppression of the perspiration occasion more particularly the disease. The influence of spring also contributes to its production. The primary lesion is a congestive macule accompanied with lamellar and furfuraceous desquamation."

Finally, in a diagnostic point of view, it must be distinguished from certain diseases which it resembles, such as urticaria, "simple roseola," and the other varieties of pityriasis, especially from "pityriasis rubra chronique ou inflammatoire" (which is the pityriasis rubra of Hardy, Devergie, and other writers). The disease we have been considering, according to Bazin, always terminates by resolution, having a natural tendency to recover. The cure may, however, be hastened by the use of alkaline or starch baths, cooling beverages, and laxatives.

From this description, which I have quoted at length to prove that the disease is the same we have been investigating, it is manifest that it was well known to this dermatologist. As intimated, he moreover states that it was even familiar to Gibert, his predecessor at the "St. Louis," who termed it "pityriasis rosea," but in the edition of Gibert's work[1] at command I am unable to find any account of the affection. To Bazin, I think, undoubtedly belongs the honour of having first described it. Shortly after, it was also recognized by Hardy and briefly described by him in the second edition of his *Leçons sur les Affections Cutanées Dartreuses* under the name "pityriasis circiné." In the third edition of this work[2] he makes four varieties of pityriasis, namely, pityriasis rubra, pityriasis pilaris, pityriasis circiné, and pityriasis alba. Concerning pityriasis rubra (which, it may be remarked, is not very clearly portrayed), pilaris, and alba it is not necessary here to speak.

"In pityriasis circiné," he says, "the epidermis, as in eczema and psoriasis, affects a circular disposition and a regularity which is very clearly and well defined. Apart from this particular the objective symptoms are those which belong to pityriasis in general. Thus, we see disseminated upon different parts of the body a variable number of disks or of segments of circles from two to three centimetres in diameter, of a rosy colour in the beginning and covered with fine epidermic scales, more abundant and denser on the periphery than in the centre, and giving sometimes a slight grayish tint to the skin, especially when the patches are numerous and close to one another. Within six weeks or some months the patches run their course: The redness vanishes, and the scales disappear, leaving sometimes in their place only a mealy dust. The itching and the smarting, while never obtaining a great degree of intensity, are nevertheless sometimes very disagreeable. The chief point of this affection is its similitude with tinea circinata (l'herpès circiné), and the real difficulty of distinguishing them at first."

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[1] Traité Pratique des Maladies de la Peau. Paris, 1840.

[2] Paris, 1868.

In speaking of the diagnosis between these diseases, he says:—

"It is very important in a practical point of view to distinguish them, for while they resemble each other in their exterior aspect they are far removed in their nature and origin, the one being a parasitic affection, the other a dartrous disease.

"In the first place each of the diseases has its special territory, and they rarely manifest themselves in the same regions; but this point is only of moderate importance and is altogether secondary; in an attentive comparison of the diseases we find other differential characters of value. Thus, in pityriasis the patches are numerous, less extensive, and remain fixed in their dimensions during the entire course of the disease. The disks of tinea circina, on the contrary, are as a rule less numerous; they are, in the beginning, also confined, as in the case of pityriasis, but soon they extend themselves centrifugally very rapidly and pronouncedly, and at the same time that the periphery invades the neighbouring parts the centre recovers in a manner, so as to form a ring of which the circumference, scarcely raised, presents vesicles or small pustules, which never exist in pityriasis. Finally, the microscopical examination will dissipate all doubt, if any such still exists. There only remains to be mentioned the likeness which stands between pityriasis circinata and psoriasis circinata. The more marked disposition of the patches, their thickness, and the manner of imbrication and the tenacity of the scales in psoriasis, together with the tumefaction and the special redness of the skin, render an error almost impossible."

From this description it will be seen that the author is evidently treating of the same disease as that being considered, but the account is too brief to be of much value, as from it one could scarcely recognize some of the cases that I have here reported.

More recent French writers, on the other hand, as Gailleton[1] and Guibout,[2] do not seem to be familiar with the disease, as no mention is made of it in their respective works. This occurs to me as being all the more singular, when we reflect that the former author is "ex-chirurgien en chef de l'Antiquaille," at Lyons, the hospital where the observations of Horand (about to be referred to) were noted, and that Guibout, one of the staff of the St. Louis, has long been identified with this hospital, the scene of the studies of Bazin and of Hardy referred to. Moreover, I have looked in vain, with one exception, for any reference to or mention of the affection we are considering throughout the numbers of the journal which is the exposition of French dermatology—the *Annales de Dermatologie et Syphiligraphie.* The exception is an article by M. Horand, surgeon to the "Antiquaille," entitled "Notes pour servir a l'histoire du pityriasis circiné," which appeared in the periodical cited in 1875–1876.[3]

In this communication Horand premises his observations by stating that there exists a disease of the skin, that he has encountered in children, of which the diagnosis was embarrassing, and of which moreover almost no information was to be derived from dermatological works. The writer continues that Hardy alone mentions the affection, but in a manner so insufficient that its characters would scarcely be recognized. He then proceeds to give the notes of seven cases, all occurring in children, the descriptions being sufficiently detailed and so accurate that upon a careful perusal of the article I had no hesitation in concluding that the disease was the same that I had from time to time encountered, but chiefly in adults, and which had to me also proved a source of embarrassment in diagnosis. I shall not weary you, gentlemen, by quoting the particulars of these cases, but in justice to M. Horand I shall present his description of the disease together with such other information as may seem of value. This is the more important, as his observations, as you will note, differ in several points from the account of the disease presented by me.

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[1] Traité Elémentaire des Maladies de la Peau. Paris, 1874.

[2] Leçons Cliniques sur les Maladies de la Peau. Paris, 1876.

[3] Tome vii. No. 5.

"This affection," says M. Horand, "has its seat upon the neck, trunk, and limbs, but manifests itself especially on a level with the scapular, deltoid, and sub-clavicular regions. It is made up of discrete or confluent patches, of which the dimensions vary ordinarily between those of a lentil and those of a two-franc piece. It is only in rare instances that they exceed these dimensions. The patches are scarcely raised above the level of the skin, rounded, and the smaller ones plentiful; the others are depressed in their centre, that is to say, their border alone is prominent, which gives them a clearly defined circinate form. Their colour varies from a pale-rose to a whitish-yellow, approaching so much the tint of the neighbouring skin that it is sometimes with difficulty that they can be distinguished from the rest of the integument, if the precaution be not taken of placing the patient in an oblique light for examination. Frequently the border alone is colored.

"The patches are always dry, the surface being more or less furfuraceous, and the tissues beneath supple, and neither thickened nor inflamed. The skin, separating one lesion from another, remains healthy. Finally, they are accompanied sometimes with a slight itching, of the kind that under the influence of the irritation produced by the scratching causes them to redden. Nevertheless, they do not occasion any inflammatory phenomena during the course of their evolution, of which the duration cannot be determined in a precise manner. The eruption may persist several months, if the patient fails to employ treatment; but notwithstanding its long duration the characters do not change, and the patches appear to retain throughout the period of their existence their original dimensions. Finally, after the disappearance of the disease no trace of its transition remains."

M. Horand continues: "It is with design that in each of the cases reported I have passed over in silence the result of the microscopical examination, reserving it for mention here. In no case has this examination been neglected; in each instance I can say that it was made with the greatest care, for the purpose of ascertaining whether or not the affection was due to a parasite. I took care to macerate the epidermic dust, obtained from scraping the patches, for twenty-four hours in ether; of washing it with alcohol after the evaporation of the ether, and of preserving the preparations in glycerine and in acetic acid. But never having found the elements which characterize the vegetable parasites, I believe that I am authorized in maintaining that this cutaneous affection is not of a parasitic nature. It does not appear, moreover, to be contagious, notwithstanding that I have been called to treat two brothers suffering with the disease, for both had been exposed to the same causes for contracting it, that is to say, both had been in bad hygienic surroundings. As to the general health of patients, it is ordinarily very good."

M. Horand proceeds to say, that "in seeking for a place in which to classify the affection, we observe that it is a dry disease, consisting essentially of a very

> fine furfuraceous desquamation, and that it therefore belongs to the group 'pityriasisique.' Moreover, the circinate form and the definite dimensions which the patches assume constitute important characters of the eruption—in fact, a particular variety. The name which appears the most suitable for designating the disease is that of pityriasis circiné."

The writer next gives his reasons for considering it the same affection as the pityriasis circiné of Hardy, and as a different disease from the pityriasis circinata of Bazin. Upon the latter point I must, however, differ with M. Horand, for it seems plain to me that Bazin's description, as I have given it, portrays the disease so accurately that one could scarcely mistake it. While the account of the disease as narrated by Hardy is perhaps more graphic and certainly more concise, yet I think no one can question that Bazin was equally familiar with the process, and that he doubtless included other forms in his description. Horand next points out the differential diagnosis from the "erythéme centrifuge de Biett," from tinea versicolor (pityriasis versicolor), and from tinea circinata (herpes circiné); and finally mentions the treatment that he has found most efficacious, which consists of baths, either with sulphide of potassium or sub-carbonate of sodium, and of frictions with black soap, or of alkaline or mercurial ointments. He adds that the eruption presents no gravity, and that its treatment is of the simplest kind. This concise and admirable article does not seem to have attracted the attention of which it was deserving. A brief abstract appeared in the *Vierteljahresschrift für Dermatologie und Syphilis*, with a short criticism by the editor, who, from his remarks, evidently fails to recognize in the description a distinctive disease, or even any value in the communication, for he concludes the abstract by saying that

> "inasmuch as the author acknowledges that in several cases he has found the disease associated with eczema and impetigo, the interpretation of the disease as pityriasis rubra, *i. e.*, the squamous stage of eczema, will doubtless prove that which will for the most part stand the test."

A similar abstract of the paper, by Dr. James C. White, also occurs in the *Boston Medical and Surgical Journal*, Dec. 7, 1876.

Concerning the name pityriasis maculata et circinata, I have at present but little to say, for my object in this communication is to bring forward the clinical features of the disease, and not to enter into a discussion upon nomenclature. I would only add that at present I see no reason for suggesting a new name for the disease, especially as the term has long been employed by both Bazin and Hardy. Moreover, the name expresses the chief features of the disease sufficiently clearly for practical purposes. While it is not my intention now to consider the subjects of the etiology, pathology or diagnosis of the affection, I cannot refrain from briefly remarking upon the matter of diagnosis that the disease, in my opinion, is distinctly defined from eczema squamosum, psoriasis, seborrhœa, lichen ruber, and from pityriasis rubra, as described in my "Treatise on Diseases of the Skin." The relation which it may have to the pityriasis rubra of other writers is a question too extensive to be engaged upon here. I myself cannot view the process as in any way related to this disease. The likelihood of its being a vegetable parasitic affection must also, I think, be definitely excluded.

In reviewing the chief characters of the disease, as depicted by Hardy, Bazin, and Horand, I note certain points of difference between these observers, especially the two latter, and myself, some of which are of such importance as to call for remark. In the first place the natural history of the affection is not clearly brought out by either observer, but little information being given concerning the primary lesions and their subsequent evolution and involution. Thus, neither speak of the rapid, and in some cases insidious, development of the lesions; nor of the great extent of surface which may be involved; points, I think, of importance. Neither observer, moreover, refers to a prominent symptom, namely, pigmentation, which in all of my cases was a conspicuous feature. The spontaneous involution of the process, although variable as to time, is also worthy of special remark. Horand observed the disease in children only, the ages of his cases varying between seven and thirteen. Mine were all in adults. I mention this particularly because the circumstance aids in explaining certain points of difference between this writer and myself, such, for example, as colour and elevation of the lesions, pigmentation, thickening of the skin, extent of disease, and the history. The cases reported by me manifestly portray a much more extensive and formidable disease than do those of Horand, and the two series are therefore both valuable in that they supplement each other, and taken together afford considerable information concerning the process.

Article IV.

The Surgical Treatment of Cancer of the Rectum. By Charles B. Kelsey, M.D., Surgeon to the East Side Infirmary for the Diseases of the Rectum, N. Y., etc.

The treatment of malignant disease of the rectum is designed to be either curative or palliative. In a small number of selected cases a cure is perhaps possible, as with cancer of feeble malignancy in other parts of the body, *e. g.*, epithelioma of the lip. At all events, the disease may be removed and its return delayed for many years. This fact, we believe, may be accepted as proved by a sufficient number of carefully examined cases from which the chances of error in diagnosis and subsequent history have been eliminated. Cure can, however, only be effected by excision. All other means may be set aside as hopeless failures.

The operation of excision, which after being fully described and ably advocated by Lisfranc in 1830 was allowed to fall into disuse, has again within the last few years become popular. It would probably be a waste of time to inquire to whom the credit of reviving it is due. Cases of its occasional performance are scattered through the surgical literature of the rectum from the early part of the century to the present, and just now it is at the height of its popularity. Like every other surgical procedure at that point of its history, it is perhaps also occasionally done when it were better to be content with less radical measures. As a result of a careful search among the statistics of this operation, Cripps[1] gives the following figures. Out of a total of sixty-four cases, eleven died as a direct result of the operation; six from peritonitis, one from cellulitis, and four from accidents incident upon any surgical interference. There is little doubt that this mortality might be reduced by a more careful selection of cases, as in the six cases of death from peritonitis, the peritoneum was opened in three, and in the other three the disease reached fully three inches from the anus. The height to which it is safe to go in this operation cannot be definitely stated for all cases, the reflexion of the serous coat upon the rectum being at a variable point. Fochier[2] reports a case in which he used the écraseur at twelve centimetres without harm, and Allingham,[3] who is always a safe guide, has seen all but the lower two inches of the bowel covered by peritoneum in a female, has opened into it in a male when not more than three and one-half inches were removed, and has taken away fully five inches in a male without bringing it into view. We can only say that the danger increases with every line above three inches. In the fifty-three cases of recovery the subsequent history is unknown in sixteen, and in three more the diagnosis was so doubtful as to exclude them from the list. No case is worth much in the consideration of a question such as this where the diagnosis has not been verified by the microscope in competent hands; for there are non-malignant growths of this part, which, to the naked eye, strongly resemble cancer. We have then a remainder of thirty-four, in whom the disease returned in twenty; but of these twenty, several were operated on a second time for a recurrence of the growth, or possibly for a small nodule which had not been removed at the first operation, and after this second operation remained free. This leaves, however, a total of twenty-three out of sixty-four operations in which the disease had not returned after an interval varying from a few months to over four years—a limit reached in three cases.

This is certainly an encouraging result for this disease, and the fact that undoubted cancer may be removed and not reappear for such a length of time is decisive. Some operators, however, report better results than these, and some have not been so successful. Curling[1] gives one case of removal of an epithelioma in which there had been no return in the rectum after seven years, though for one year there had been "a doubtful tumour of the pelvis." Velpeau and Verneuil each report cases in which the cure has seemed permanent, and Chassaignac gives several in which there had been no return after six years. Dieffenbach's thirty cases in which the patients lived many years without a return are generally looked upon with suspicion. Allingham,[2] on the contrary, considers the *partial* removal of the circumference of the bowel as unsatisfactory. In all of his thirteen cases in which he was able to follow the progress of the case for one year, there was either a return of the growth in the rectum or the glands in the groin became affected and there ensued disease in the internal organs. In four cases the disease did not return in the bowel but in the inguinal glands, proving that it was not due to an incomplete operation. With regard also to his ten cases of *total* extirpation he speaks very cautiously. He believes that a cure is very uncommon and not generally to be expected; and he does not commit himself even on the question of the prolongation of life. The mortality, as a direct result of the operation, is generally about twenty-five per cent.[3]

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[1] Cancer of the Rectum, London, 1880, p. 166.

[2] Lyon Méd., Feb. 20, 1876.

[3] Diseases of the Rectum, ed. of 1879, p. 275.

Since then, in certain cases, we are justified in expecting recovery from the operation itself and such a length of life as would not result were the disease left to its natural course, we may ask to what cases is it applicable? what are the methods of its performance? and what the after results as regards the condition of the bowel? Unfortunately we rarely meet the disease at a stage when extirpation is justifiable, that is, when it is limited to a circumscribed spot within three or three and one half inches of the anus, when it is movable on the muscular coat, and has not invaded the deeper tissues, and before the neighbouring glands are enlarged. L. A. Stimson's[4] study of cases is very valuable in this connection. He bases the prognosis as to immediate return far more upon such naked-eye appearances as these than upon the microscopic character of the growth. We should certainly not consider it advisable, as has recently been done, to attempt excision in a case where the peritoneum was deliberately opened in a woman, it being palpably impossible to extirpate the growth without cutting into that cavity. The prospect of prolonging life is not sufficient to compensate for the danger of immediate death, or of certain local return. The operation has once been abandoned and will certainly be so again unless it is kept within narrower limits than these.

There are many ways in which the rectum may be wholly or partially removed, but it does not fall within the scope of this article to describe them in detail. The knife, écraseur, elastic ligature, or the galvano-cautery may be used, and each operator has his favourite method. The rectum may be freely laid open by a deep, posterior, median incision as a preparatory step, and the two sides dissected up laterally from this as a starting point; or two elliptical incisions may be made surrounding the anus, and the dissection carried along the bowel from without inwards. The ligature and galvano-cautery are chiefly in favour as means of avoiding hemorrhage; but, though hemorrhage is one of the things to be looked after, the main requisite in controlling it is plenty of room, and this is best obtained by the posterior incision through rectum and anus nearly to the tip of the coccyx. This cut greatly facilitates the performance of the operation, and, moreover, allows free drainage subsequently. The accidents most to be feared are opening the peritoneum and wounding neighbouring viscera, and in avoiding these, the advantages of a careful and, if necessary, deliberate dissection with the knife over the écraseur or cautery are manifest. In the female the recto-vaginal septum may be removed to a considerable extent without interfering with the good result, but a wound of the vesiculæ seminales or base of the bladder in the male is not so light a matter.

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[1] Diseases of the Rectum, ed. of 1876, p. 164.

[2] Loc. cit., p. 277.

[3] Mollière, Traité des Maladies du Rectum et de l'Anus, Paris, 1877, p. 627.

[4] A Contribution to the Study of Cancer of the Rectum, "Arch. of Med.," Aug. 1879.

With regard to the condition of the parts after operation, two opposite conditions are to be feared, stricture and incontinence of feces. The former may be met by dilatation, and the latter is not a contraindication to the operation. Experience on this point is almost unanimous, Allingham being the only author who seems not to have had satisfactory results. It is certain that the whole sphincter muscle may be removed and the patient recover a comfortable degree of control over everything except fluid motions. This is due to the greater or less degree of contraction which always follows; to the action of the mucous membrane which may become more or less prolapsed and act as a valve; to the fact that a few fibres of the sphincter may have been left; to the thickening of the muscular tissue at the lower end forming a rudimentary sphincter; and to the physiological fact that the sigmoid flexure is the reservoir of feces, and that normally the rectum is an empty pouch, only filled at the time of defecation. Bearing this point in mind, it is easy to understand how the sphincter may be dispensed with, and no other explanation seems so well to account for what is an undoubted clinical fact.

The palliative treatment of cancer of the rectum is directed chiefly toward fulfilling three indications: 1. Relief of pain; 2. Overcoming obstruction; 3. Cleanliness. We shall consider each of these in its order. The pain in this affection depends on two classes of causes—those which make cancer a painful disease wherever met with in the body, and those which are due solely to its situation at the outlet of the bowel. Among the first, we have pressure upon adjacent parts and involvement of neighbouring organs and nerves; and among the second, the passage of feces over an ulcerated surface and spasm of the sphincter muscle from irritation caused by its direct implication in the cancerous growth, or by the passage over it of irritating sanious discharges from the sore. From this it is easy to understand why cancer is in one person attended by excruciating suffering, while another may hardly be conscious of its presence; and why the pain is in some paroxysmal and particularly aggravated by a movement of the bowels, and in others dull and constant, radiating through the loins and down the thighs. For the relief of this symptom we have at our command: *a.* Regulation of the passages, diet, and the recumbent posture; *b.* Anodynes locally and by the mouth; *c.* Partial destruction of the growth by means of the curette, cauterization, or partial extirpation; *d.* Division of the sphincter; *e.* Lumbar colotomy.

The passages should be kept soft but not fluid, as any approach to diarrhœa always aggravates the suffering. This may be done partly by the choice of food, which needs to be regulated with great care on account of the tendency to gastric disturbance, more or less of which is always present, and by the administration of the mineral waters, which are generally sufficiently laxative for the purpose. Rest in the recumbent posture is a means of palliation of great value, sometimes giving more relief than anodynes. These latter may be given both by the mouth and in enemata, and if possible should be pushed to the point of relieving suffering. This seems so plain a duty which the surgeon owes to his patient that we need not stop to discuss any possible moral bearing it may have. If the agony of this incurable malady could always be relieved by the administration of opium, the question of operative interference would arise much less frequently than it now does. But, unfortunately, the constant administration of this or any other narcotic will sometimes cause gastric and mental disturbance harder to bear than the disease. By using the finger-nail, a curette similar to the one used in the uterus, or a scoop such as is used for submucous uterine tumours, the pain may in some cases be greatly relieved by a removal of a part of the growth when of the soft variety. The same may be done by the application of chemically destructive agents or the actual cautery, and even by the partial excision of the mass, merely as a means of relief and where there is no question of cure.

In a previous paper[1] I have already called attention to division of the sphincter muscle as a palliative measure in the treatment of rectal disease, and have tried to show that the pain in malignant growths was often due in a great measure to its spasmodic action, and might be permanently relieved by its complete division. That the operation itself was devoid of danger, and that its results in proper cases fully equalled those of the more dangerous operation of lumbar colotomy, was also proved; and an attempt was made to reduce this operation, whose good results were first shown by the French surgeons, to a definite rank among the means at our control for the treatment of painful affections of this part.

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[1] Division of the Sphincter Ani Muscle as a Therapeutic Measure. New York Med. Journ., June, 1880.

I see that Allingham, in his last edition, also adds his testimony in favour of the value of the operation, which may be performed in several ways, all having the complete division and paralysis of the muscle in view; and is absolutely indicated in all cases where the muscle is found firm, irritable, and inclined to spasm. In such cases the relief of suffering will sometimes be so great as to deceive the patient into the belief that his cancer has been radically cured, though it has not in reality been touched. There is a class of cases in which the sphincter will be found in a condition exactly the opposite of this—relaxed, patulous, admitting readily the larger blade of Sims's speculum. In such the disease will generally be found well up the rectum, and probably by its pressure has paralyzed the nerves which supply the muscle. Here the operation can give no relief.

We come now to the *dernier ressort* of surgery for the relief of pain—lumbar colotomy, and there are several points in connection with it which should be well borne in mind. We may ask, 1, to what cases is it applicable? 2, what is the danger to life in its performance? 3, what hope of prolonging life does it give? Taking these questions in their order, we should say it was applicable only to those cases in which the pain may reasonably be supposed to be entirely or in great part due to the direct contact of the feces with the diseased surface. There are such cases, and in them the operation accomplishes what no other means will, and the sufferer feels amply repaid for having submitted to it if he lives but a few weeks in comfort; but such cases are not common—not so common, we submit, as is the performance of lumbar colotomy. If one were to judge from the published reports of this operation which appear from time to time in the current journals, he might suppose that the mere diagnosis of a cancer of the rectum was in itself a sufficient reason why the sufferer should at once be furnished with an artificial anus. There could be no greater error, and the operation is often done without affording any relief, and perhaps in cases where such a result might have reasonably been anticipated. We have placed it last on the list of known methods of relieving pain, and have called it the *dernier ressort*, and such it is. When none of the other means we have mentioned serve to make life comfortable it is time to consider whether this one is likely to. As to the immediate risks of the operation statistics are difficult to obtain. Bryant, in fifteen cases for various diseases, gives one death from peritonitis, and two within the first three days, "the operation having been undertaken too late." Curling in twenty-one cases has had seven fatal results, two from chloroform, one in which peritonitis already existed, one from pyæmia, two from exhaustion, and one from a peritonitis which sprang from the disease and not from the wound. Allingham in twenty-seven cases has had no deaths which could properly be attributed to the operation; a fact probably due to the care with which his cases were selected. In fact such figures as these show better than would any elaborate tables the dangers of the operation. In properly selected cases the immediate danger is peritonitis, not a very great one, and, in addition, the accident of not finding the part of the bowel intended—a thing which has often happened to the best operators. If the operation is attempted when the patient is too weak to bear the anæsthetic, or is in the last stage of exhaustion, the mortality must of necessity be great. As to prolonging life, when the patient is in danger of immediate death from obstruction this may be done; also when death is imminent from the intensity of the suffering a few weeks or months may be gained in which the cachexia shall run its natural course. But the average length of life in cancer of the rectum is not much over one year from the time the patient generally comes fairly under observation of the surgeon, and whether lumbar colotomy be done early or late the time when life shall yield to the gradually advancing cachexia will not be much affected.

For overcoming obstruction—the second indication in palliative treatment—we again find numerous means at our disposal. These may be grouped under the following general heads: 1, dilatation; 2, division; 3, destruction; 4, lumbar colotomy. Before commencing to treat the obstruction as such it is well to remember that an exceedingly small outlet to the alimentary canal may, with proper care, be made to answer all the calls of nature. We see this constantly in cases of stricture both simple and malignant, where the finger cannot be forced through the obstruction, and yet there is no retention; and in such cases by the judicious administration of laxatives life may be made so comfortable that the question of surgical interference shall be postponed indefinitely. When, however, dilatation becomes necessary, it should be of the gentlest kind. The cases of fatal accident from perforation of the bowel where the coats have been weakened by ulceration are already numerous enough to serve as warnings for all future time. The best of all dilators in cancerous disease is the finger, either that of the patient or the nurse, passed daily; and none of the mechanical means with which we are acquainted equals this for safety and comfort. If dilatation be found too painful or ineffectual, as it sometimes will, recourse may be had to division of the stricture.

Under the term rectotomy many different procedures are included,[1] such as nicking the stricture at one or several points; free division in the median line by a single deep incision either anteriorly or posteriorly or both; division of the stricture and of all the parts below, including the anus, with the knife, écraseur, or thermo-cautery (external rectotomy of Verneuil), etc. The latter is the most radical and the safest of all, for the reason that it permits free drainage and discharge of fluids. Instead of this, attempts may be made at opening a passage by the destruction of a part of the growth, as has been explained in speaking of the relief of pain.

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[1] See N. Y. Med. Journ., March, 1880.

There is no constriction within four inches of the anus which may not be overcome by some one or other of these means. What then remains for lumbar colotomy? Simply those above the reflexion of the peritoneum. We have tried to show with regard to this operation that it should be a last resort; that there are many simpler means at the hand of the surgeon for accomplishing what it is intended to accomplish; that it is at best simply a palliative measure, and one by no means devoid of danger; and that the cases in which it is likely to be justified by results may be selected with considerable certainty beforehand.

The last indication to be met is cleanliness, and this will be found necessary chiefly in those cases where from extensive ulceration the anus has been destroyed, and the whole rectal pouch converted into an open sore. There is nothing better perhaps as a disinfectant in such a case than a weak solution of permanganate of potash, or, where the discharge contains much blood, one of the usual astringents.

No. 48 East Thirtieth Street, New York.

Article V.

Contribution to Our Knowledge of Nervous Syphilis.

By H. C. Wood, M.D., Clinical Professor of Nervous Diseases in the University of Pennsylvania.

The more I have seen of nervous diseases, the stronger has grown the conviction that syphilis is a prime factor in their etiology. It is also certain that our knowledge of nervous syphilis is at present very imperfect. Consequently, it has seemed to me worth while to record some of the many cases which have fallen under my notice, without attempting at all an elaborate paper upon the subject. One great present drawback in the study of nervous disease is the habit of publishing cases, in which the diagnosis has not been verified by post-mortem examination. Generalizations founded upon guesses are certainly obstacles rather than aids to progress. In endeavouring to avoid this error, I shall report in full only cases verified after death; and shall rest the conclusions reached chiefly upon their teachings.

The first point I desire to call attention to is that the symptoms of cerebral syphilis may develop themselves with great rapidity and severity, and require such treatment as is given to acute inflammatory attacks of the brain or its membranes not dependent upon a specific cause. The record of the first case illustrating this is as follows:—

Case I.—*Cerebral Syphilis; Recovery; Relapse; Explosive Cerebritis or Meningitis.*—Mr. A., white, æt. 28 years, single, nervous temperament, always enjoyed good health, healthy parentage. He contracted syphilis in 1875, but made a speedy recovery after showing slight secondary erythematous rash. The chancre was cauterized with nitric acid, and the subsequent treatment was by the administration of blue pill, to the extent of salivation, followed by iodide of potassium with corrosive sublimate. He had no further trouble until some time in 1877, when he began to suffer from hemicrania, followed by a general disinclination for business, and a slight loss of power in the left arm; he now took, without medical advice, immense doses of bromide of potassium without benefit, and was subsequently treated unsuccessfully by a homœopathic physician for several months.

He finally came under the care of Dr. R. S. McCombs, by whom I was called in consultation February 27, 1879. At this time the paresis had increased to the extent of involving the whole left side, but was most pronounced in the left leg; there was sleeplessness, with a tendency to wander about at night, decided loss of memory, very marked mental apathy, great failure of the power of fixing attention, and persistent hallucinations. For a time the delusions proved the most striking feature of his case. Thus he complained of women annoying him at night by attempting to get into his bed, of a sardine box being in his nose, etc. etc. There were no detectable disorders of special sense. The right optic disk was found to be congested and somewhat swollen; the left disk being normal. There was not much headache, and when asked how he felt he always responded "all right." There was loss of appetite, with constipation, but no disorder of the bladder.

He was given iodide of potassium in very large doses, and gradually improved so that in June, 1879, he was attending to business and was considered well.

In the latter part of July he began to drag his limbs and to develop an ataxic gait. This at first was most marked in the left leg. He now went to Atlantic City and took two or three sea baths. Immediately after these baths there was a rapid increase of his symptoms, and both legs became equally affected; the mind remaining perfectly clear, and indeed all his cerebral functions seemingly normal. He was treated with rest and antisyphilitic remedies. The legs got weaker and weaker, but the bladder and rectum were not affected, and there was no pain. On the 20th of August his symptoms at noon were about as they had been, but he stated to the physician in charge that he had had a chill in the morning; there was, however, no fever that could be detected by the skilled hand, and no recognized indication of the coming storm. Between twelve and one o'clock of the same day, without any obvious cause, he was seized almost instantly with a violent convulsion, accompanied by very marked and persistent opisthotonos. There was no relaxation up to the moment of his death, which occurred in about half an hour; during the whole convulsion he was unconscious. The attack was so sudden that it cut short a sentence which he was speaking, and which was broken off in the middle never to be completed.

The *autopsy* was made two days after death; the body having been preserved in ice and being in perfect condition. The *meninges* of the brain were intensely congested, but free from exudation. The *brain* structure was normal but congested. No tumour could be found in it. The *pons and medulla* were distinctly softer [post-mortem?] than normal. The *cervical cord* was alone examined; it was found to be very soft, but was not preserved for microscopic examination. Its meninges were congested, but not to the same extent as were those of the brain.

The post-mortem examination in this case was, owing to my absence in Europe, not as complete as it should have been, but is sufficient for the purpose in hand. The rapid death, along with the fact that consciousness was lost the very first moment of the convulsion, shows that the latter was not spinal; whilst the condition of the brain and its meninges found after death would indicate that the immediate cause of death was congestion of the brain, especially affecting the membranes, or in other words, what might be called an explosive *meningitis.*

I have seen one case, whose symptoms were similar to those of Mr. A., but in which death was averted by the free use of the lancet. The record of this is as follows:—

Case II.—In this instance a man who believed himself to be in perfect health, complained one afternoon of feeling unwell whilst visiting an acquaintance. He went almost immediately home and sat down in a room upon the ground floor; in a few minutes he became semi-unconscious and was carried upstairs, put to bed, and in a very short time was seized with a violent convulsion. Two hours later he was seen by Dr. A. Fricke, who found him wildly delirious and suffering from a constant succession of clonic and tonic convulsions. At first ordinary remedies were tried without avail. Then two and a half pints of blood were drawn from a large orifice in the arm, so that the pulse failed very much. Perfect quiet and general relaxation followed this; an hour or two later twitchings of the muscles and other threatenings of convulsions happening, the patient was cupped freely upon the temples. No further disturbance occurred, and the next morning the man awoke quiet and rational. It is not necessary to discuss in any detail the further progress of the case, suffice it to state that evidence of progressive brain degeneration followed during some weeks, but so soon as the true nature of the disorder was suspected and antisyphilitic treatment instituted amelioration began, and finally ended in perfect recovery. During the convalescence an unmistakable syphilitic rash appeared.

These sudden attacks of brain congestion or of meningitis may develop not only at the outset but at any time during the progress of a cerebral syphilis.

Case III.—Some year or two since, I saw a patient on a Monday at the dispensary service of the University Hospital, and made a diagnosis of cerebral syphilis, probably meningeal in type. Iodide of potassium was prescribed, and nothing further was heard of the case, until a message was received on a Friday that the man was dying of poison administered by us. On visiting the dwelling of the man, it was found that some hours after his visit he had been seized with a convulsion followed by delirium. Although unconsciousness and delirium had been present from the first the diagnosis of strychnia poisoning was made by his attending physician, and the friends were told that the hospital doctors were well meaning, but had overrated the patient's strength and given him medicine too strong for him. The third day it was thought wisest to send for the hospital doctors. The man died a day or two after his removal to the ward, and the autopsy revealed a very intense acute meningitis engrafted upon an old meningeal inflammation.

I have seen from time to time various cases of cerebral syphilis in which the chief symptom complained of has been a peculiar mental apathy. Associated with this has been in some cases failure of memory, loss of power of fixing the attention, and other evidences of cerebral disease, but usually no headache. In a few instances the attention of the patient's friends has been chiefly attracted by the peculiar mental listlessness, the other manifestations of disease being so slight as to pass unnoticed.

Case IV.—Some years since a man of about thirty years of age was sent to me by a surgeon of this city with the statement that almost the only thing amiss was a peculiar and persistent change in disposition; from being very social and bright the patient had become reserved and morose; and whilst formerly he had been a very active and successful business man he had grown careless and untrustworthy, manifesting no interest in his occupation. On careful examination, I found that he dragged one foot a little, and that there was undoubtedly failure of memory. There had been no headache, giddiness, or other signs of cerebral disease besides those enumerated. Syphilis had not been suspected, but he acknowledged having had a chancroid, which was not followed by secondary symptoms. He was given large doses of iodide of potassium, began at once to improve, and ultimately recovered perfectly.

The entire absence of headache in this class of cases has seemed anomalous, but recently I have had an opportunity of following to the end a case which shows that disease of the gray matter of the brain may progress to the last extent without producing any pain. In operating upon animals I have often noticed that whilst section of the meninges produces great uneasiness, the gray matter is insensitive, and I am by no means sure that organic brain disease ever gives rise to headache, when there is no disturbance of the membranes or of the intra-cranial pressure. The report of the case alluded to is as follows:—

Case V.—*Sclerosis of Cerebral Convolutions of Syphilitic Origin.*—Mr. J——, æt. 39, contracted syphilis, 1861, and subsequently suffered from marked secondaries, but eventually recovered entirely. In the spring of 1876 he began to lose the power of expressing himself, words following his ideas slowly and with difficulty. There was no headache, and no loss of memory or other evidence of mental failure. He was seen by me in consultation, first, early in the year 1877; at this time his speech was very slow, with long pauses between the words, but there were no other signs of disease except some tremulousness and great nervous irritability. He had been previously of a social, pleasant disposition, now slight irritations threw him into a state of intense general excitement. He was ordered iodide of potassium in large doses, and was sent into the country, from which he came back six weeks later, apparently restored. On his return to business, his symptoms soon began to reappear. The aphasia was never more marked than at first. There was no headache, no failure of memory; up to the time of his going to the asylum he could relate circumstances with minutest detail which occurred many years previously, and his memory for recent events was equally accurate. As early as January, 1878, he began, however, to lose the power of fixing his attention, which was especially shown in attempts at casting up his accounts. At the same time mental effort became difficult to him, and efforts to calculate or to explain himself gave rise to great mental excitement, which at times was so intense as to lead bystanders to think that he was crazy. He suffered also from sleeplessness and marked tendency to wander around the house at night; there was no paralysis whatever, and all his organic functions seemed normal. The special senses were not affected. He was treated with very large doses of iodide of potassium, counter-irritation by means of blisters and seton, with complete mental rest and physical exercise. An unsuccessful effort was also made to produce ptyalism by the free and persistent use of calomel and other mercurials internally, aided by mercurial inunctions; notwithstanding treatment his symptoms slowly progressed. A very marked feature which developed itself early was a complete loss of the faculty of measuring the relative importance of subjects, thus he would talk interminably about matters of the most trivial character, and would fail to appreciate the bearings of most important events; as the case progressed, this symptom merged into complete childishness, with a disposition to hide things, greediness at table, etc.: his affections also became distorted. In October, 1879, he fell down stairs, cutting his scalp, and producing slight evidences of brain concussion, such as dilatation of the pupils, sickness of stomach, and increased mental confusion. About six hours after this he was suddenly seized with a violent epileptiform convulsion, which was followed by unconsciousness lasting more than twenty-four hours; when he came to himself there was marked paresis of the right side, which lasted about two weeks. After the convulsion he gradually became more and more unmanageable and childish. Although he never had distinctly destructive mania, he would tear or throw away his clothes when he did not like them. There were no hallucinations, but he at last became so uncontrollable that it was necessary to place him in an asylum, where he accidentally scalded himself to death.

Autopsy.—Brain alone examined. The whole upper surface intensely bright red; the pia mater abnormally adherent, but not opaque; the dura mater normal; the convolutions seemingly flatter and smaller than normal. The consistence of the brain normal, except the surface of the island of Reil, which was softer than it should be. No tumour or disease of the larger vessels discoverable.

Microscopic Examination.—Sections of several of the convolutions of the anterior lobes and of the island of Reil were examined. Pia mater containing numerous embryonic cells, its bloodvessels everywhere stuffed with blood; *gray matter* of the convolutions; embryonic neurogliar cells everywhere very much more abundant than normal; ganglion cells reduced to roundish or oval bodies, and in many places in great part entirely disappeared. Bloodvessels usually full of blood, here and there aneurismally enlarged; perivascular spaces more or less completely filled up with multitudes of embryonic cells, which appeared to have been developed within the perivascular space. White matter just below the gray matter in similar condition to the latter, but changes of its bloodvessels evidently had not progressed so far.

Island of Reil.—Condition as in other parts of the brain, but seemingly further advanced. In one place evidences of an old clot, consisting of a small spot of fatty degeneration, around blood crystals. There were also some fatty or amyloid masses following in some cases the paths of the vessels.

There is even less known in regard to syphilis of the spinal cord than of the cerebrum. Of the various cases which have come under my notice there are only two in which opportunity of making a post-mortem examination occurred. Syphilitic disease of the cord is much more serious than the corresponding affection of the brain. An obvious reason for this is the small size of the spinal nerve mass and the confined space within which it is inclosed by bony walls. Even a simple gummatous tumour by pressure may very readily produce a disorganization which shall remain and cause permanent disability after the removal of the tumour. Ignorant as we are in regard to the class of affections now under consideration, there are some points which are gradually becoming defined. One of these, I think, is the extreme rarity of specific spinal meningitis; a second is that sclerosis, when once established, even if it be of specific origin, is not relieved by antisyphilitic remedies. In its earliest stage chronic specific myelitis may be influenced by appropriate treatment, but when once the sclerotic degeneration has fairly commenced its development the case seems to be hopeless. Of all the forms of spinal syphilis, that in which a gummatous tumour is the offence is most curable. The diagnosis is therefore important as affecting prognosis. My experience so far makes me believe that a certain diagnosis in most cases is not possible, at least in an early stage of the affection. The history of the cases of spinal syphilis which I shall put on record is as follows.

It should be stated that there is no positive proof that in either of these cases the disease was really due to syphilis; the probabilities rest simply upon the facts of a more or less distinct syphilitic history, that great benefit was at first derived from antisyphilitic treatment, and that there was a remarkable tolerance of mercury and iodide of potassium.

Case VI.—*Chronic Specific Myelitis.*—G. B., aged 42, a very large, powerful man, before sickness weighing 240 pounds, a superintendent of mines. He had been a sharpshooter in the war, and was wounded five times without permanent injury. He had a chancre in 1861. He states that about eighteen months ago he came out of the mine after several hours' very severe labour during an emergency, exhausted, and his clothes saturated with perspiration. The outer air being cold, he was completely chilled; to this he dates his present illness. Several days after this he suffered from crawling sensations in his limbs, and a few days later a feeling of intense coldness in the upper portions of both feet, which gradually extended up the front of the legs to the belly. He says that the parts felt as though they were frozen, and that the backs of the legs never were affected. Whilst this paresthesis was being developed he noticed that slight touches of the legs would cause them to jerk, and also that the skin was becoming exceedingly sensitive. There was never any pain in the limbs when they were not touched. Sexual power was lost early in the attack. There was not any trouble with the bladder. Bowels constipated, passages always very small, size of the little finger (from rectal spasm?).

Present condition.—Weight 153 pounds. The sense of coldness not so intense as it has been, but extending as high as the eighth rib. Tapping the vertebra up to this point produces intense pain. He complains of a band of constriction referred to the lower edge of the ribs. Below the eighth rib marked hyperæsthesia, most pronounced over the abdomen. The slightest touches produce an intense pain, which darts through him like a knife and causes him to writhe with agony; at the same time reflex actions are produced, which, if the contact be at all prolonged or forcible, are wide-spread and involve the whole lower portions of the body in spasms. Patella reflex and ankle clonus immensely exaggerated. He is able to walk, but complains much of weakness in the legs and especially in the small of his back. With his eyes open he can stand with his feet close together; when his eyes are closed he is able to stand a little while, but soon becomes very unsteady, swaying from side to side. Recently the fingers have become tender, cold, and numb. He is not able to pick up pins or other small articles. There is no elevation of temperature; pulse 72; appetite good; urine alkaline and phosphatic. He perspires very freely at night above the line of constriction. There are no hysterical manifestations.

He was put upon calomel in small but very frequently repeated doses, and the treatment maintained until distinct evidences of ptyalism were produced. By the end of January he had much improved. He walked much better, and the sensitiveness was greatly lessened; the left leg had nearly recovered its natural feelings, as had also the fingers; the right leg still felt "cold and crushed." His weight had increased to 161 pounds. He now took 120 grains of iodide of potassium a day without causing any evidences of iodism until the latter end of February, when his daily allowance was increased to 160 grains, but this had to be diminished after a few days. By the end of February the gait had become natural; the hyperæsthesia had disappeared except in a limited region of original greatest intensity upon the abdomen. The right foot was still numb.

In spite of the continual use of the iodide, he now began to grow worse. His motor powers commenced to fail, although the disorder of sensation did not return, at least in the form of hyperæsthesia; the perspiration became very profuse, occurring whenever he went to sleep. On the 12th of March, whilst walking about he fell down, from "back giving way." After this his control over the bladder grew steadily less and less. Wherever there was a hyperæsthetic area upon the abdomen the skin had a marked tendency to redness. The legs were numb, aching as though crushed, and there was very decided, though not complete loss of sensibility in the skin and also in the deeper structures of the legs. The sensation of a constricting band had disappeared. The sweats were excessive, and not controlled by treatment. The appetite failed; gradual emaciation occurred; all power over the bladder was lost, and the patient finally was scarcely able to lift the legs from the bed.

April 3. He had distinct fever for the first time in the afternoon. On the morning of the 4th he was very weak, with high fever, and rather suddenly passed into a condition of stupor ending in death, which occurred quietly the same afternoon.

Autopsy.—No bed-sores; the only portions of the cadaver examined were the brain and spinal cord.

Brain normal, both as inspected macroscopically and microscopically, except some congestion.

Spinal cord.—To the naked eye offering no distinct abnormality, not distinctly softer or harder than normal. Microscopical examination. *Cauda equina.* Medullary sheaths atrophied; many of them entirely disappeared; everywhere immense numbers of embryonic neurogliar cells.

Lumbar cord. Pia mater thickened, adherent, infiltrated with embryonic cells. White matter of all portions of the cord affected, but the changes most prononnced in the periphery of the cord and in the columns of Goll. Posterior fissures obliterated, or nearly so, by an amorphous exudation. Immense numbers of embryonic neurogliar cells everywhere. Medullary sheaths atrophied, and almost entirely disappeared, in some places traces of them discoverable. Axis cylinder often much swollen. Scattered irregularly numerous vacuoles, apparently made by the dropping out of the axis cylinders from the thin section, the medullary sheaths having been destroyed. The perivascular spaces visible, but pressed upon and choked up by great numbers of embryonic cells. Gray matter full of embryonic cells. Ganglionic cells distinctly yellowish, but usually so only in one portion, where they do not take the carmine staining (fatty?). Central canal with its lumen completely obliterated by a large mass of embryonic cells which marks its position very plainly.

Dorsal cord. Condition the same as in the lumbar portion, except that the process has not progressed so far; the posterior fissure not completely obliterated; the central canal not obliterated, but much narrowed and distorted by great numbers of the embryonic cells which are certainly beneath the epithelium.

Cervical cord. Change has not progressed so far as in the dorsal portion; embryonic cells not so numerous. Perivascular sheaths grossly dilated and forming large vacuoles, with the shrivelled bloodvessels at one side. Medullary sheaths in many places remaining; central canal well preserved, but the production of cells around it has begun.

Case VII.—*Sclerosis of the Posterior Columns; Amelioration under Antisyphilitic Treatment; Acute Myelitis; Death.*—Jno. W., a farmer of good habits, married, with healthy children, when young he had gonorrhœa; but denies ever having had syphilis. One sister died of consumption, and perhaps other members of his family. Otherwise family history good. In 1873 he fell sixteen feet, alighting on his side upon a pile of stones. He was seemingly not seriously injured, and was soon at work again. Six months later he began to lose the power of walking, and found that he had especial difficulty in moving about in the dark, in the light he was conscious of watching his feet. He also noticed that his left leg was the weaker. On cross-questioning he stated that during the six months immediately after the injury he suffered from neuralgic pains in the side, and at times from some difficulty in walking; his assertions, however, were not clear or concordant.

A short time after the power began to fail in his legs, he commenced to suffer from pains in them. These were worse in the left leg, sometimes even in the feet, sometimes in the ankle-joint, sometimes would "run up and down the legs." There were also numbness and tingling, which were especially marked in the feet, giving rise to what he called a "loss of life" in the soles. These pains and perverted sensations continued for two or three years, when they gradually ceased to plague him, but his powers of locomotion failed. He became entirely unable to walk alone, needing a person or a chair to enable him to balance himself. For the past two years his hands have tingled much and have been gradually growing numb. He now has pains in the back. Patella reflex diminished. Sensation not destroyed in the legs, though, as tested with æsthesiometer, impaired.

He was ordered iodide of potassium, increased in a few days to 120 grains a day. Under this treatment he seemed to improve, his pains in the back and arm grew less, and his walking was very much better, but he was still forced to rely upon the cane.

About the 10th of January his pains in the back began to get worse and his control over his legs to diminish. He was blistered, but on the 15th of January was taken with fever, with headache and pains in the legs and back; no appetite; much thirst. January 16th the pains became severe; during the night had muscular twitchings in his legs and painful spasms of the calf, etc., also a very marked sensation of a cord round his body. The power over the bladder and rectum also rapidly diminished. A large blister was put over his back. On the 18th, erysipelatous inflammation began in his back and rapidly spread to the abdomen and down the thighs, and the incontinence of urine became complete. The muscular pain and spasms were markedly less. The tongue was dry; the bowels very costive; great systemic prostration. The very violent erysipelatous inflammation of the lower trunk threatened his life until January 31, when it began to subside. There had been much vomiting, and the bowels had become enormously distended with gas, for the relief of which various measures had been practised in vain. The feces passed involuntarily. By the 10th of February the erysipelatous inflammation had subsided into a rather limited erythema, but there was little systemic reaction. The power had almost gone from the legs. Sensation was benumbed. The man still suffered from irregular fever. From this time he sank deeper and deeper into a typhoid state, with involuntary diarrhœic discharges, vomiting, low muttering delirium, and finally death on February 24th.

The treatment after January 18th consisted in the free use of ergot and the administration of large doses of the tincture of the chloride of iron, conjoined with support and stimulation.

Autopsy.—The cord alone examined. It seemed harder than normal.

Lumbar cord.—Columns of Goll intensely sclerotic; new tissue chiefly made up of bands with very few new embryonic cells. Medullary sheaths almost all of them disappeared, the few remaining much atrophied. Scattered here and there numerous transparent, slightly coloured, nongranular bodies, which are not stained by iodine (myeline?). *Posterior root zone.* Trabecular tissue excessive, much less, however, than in the columns of Goll; but the embryonic cells much more numerous than in the columns of Goll. Medullated sheaths very far gone, some few seen; towards the lateral columns minute spots of localized softening.

Lateral columns, with only a slight increase of their neurogliar tissue; as seen by a low power, yellow. Under a high power, medullated nerves present in groups, but over much of the field replaced by transparent tissue which does not stain with carmine; there are also scattered irregular spots where all tissues are replaced by a yellowish, structureless material and some minute pus-like bodies.

Anterior root zone. Trabecular tissue excessive. No medullated nerves detected. A few large yellowish foci like those in the lateral columns, but larger.

Anterior columns very yellow, not sclerotic, with medullated fibres and much amorphous matter as seen with high powers.

Gray matter sclerotic, ganglion cells very fatty and yellow; spinal canal obliterated.

Dorsal cord. Cord irregular in shape, distorted, highly sclerotic in the same parts as is the lumbar cord, the medullary sheaths having absolutely disappeared. Posterior columns fused together, both posterior fissure and canal obliterated. The lateral columns also sclerotic, becoming yellowish and very fatty on the borders. Anterior columns very yellow and fatty. The ganglion cells very yellow, shrunken, with loss of processes, their nucleus often very obscure.

Cervical cord. Degenerative processes further advanced than in the lumbar, but not quite as far as in the dorsal region.

Pia mater inflamed, most decidedly in lumbar region, thickened, infiltrated with embryonic cells (pus); bloodvessels distended with blood-cells to three or four times their natural calibre.

Posterior roots of the spinal nerves. Endoneurium much proliferated, infiltrated with embryonic cells. Many have their sheaths atrophied.

Anterior roots normal, and their nerve fibrils having perfect sheaths.

Article VI.

Fatal Poisoning by Mushrooms. By Adolph Kessler, M.D., of New York City.

The comparatively rare occurrence of fatal poisoning by mushrooms and its somewhat obscure pathology and symptomatology induce me to publish a report of the following two cases which happened simultaneously in the same family. Not having been able to obtain from the physician in attendance until my arrival an account of the earlier history, I am obliged to give it in the words of the surviving patient, a highly intelligent college student residing in Stamford, Conn., where the cases occurred.

Case I.—Mr. H. writes as follows: "On the 31st of August (1879), in the evening I started out to get some mushrooms for tea. I had had some the day before for dinner, and they tasted very nicely and had done me no harm. I picked about two dozen on the lawn, and as I returned with them my cousin proposed to go out to one of the pasture fields to get some more, which we did accordingly.

"The number of plants gathered amounted to about three dozen of all sizes; as to their name I am in ignorance. We supposed them to be the common edible mushrooms. In colour they were for the most part of a bright and clear white; some few of those we gathered later had a brownish tinge on the top. They were partly full-grown, that is, the cap or top (pileus) had spread itself out, and the peculiar formation of the plant was strongly marked on the under side; partly they consisted of the small undeveloped buttons growing near the ground. We applied the test of pealing the cap to all that appeared suspicious. The mushrooms were fried or boiled and brought on the table that evening. My cousin ate a good many, as he was very fond of them, my mother just tasted one, and I partook of them liberally.

"After tea we walked down to the village, and partook of some ice-cream and sat down on the veranda of the hotel smoking. That same night my cousin was taken sick with violent nausea and pain in the stomach ; I did not feel any ill effects the next morning, and drove down town to summon a physician. He came and prescribed an opium powder to be taken every hour, thinking that the sickness resulted from overloading the stomach. Towards noon I also felt ill, but did not take any of the powders, while my cousin took them regularly. I vomited once or twice during the afternoon. and oftener in the evening. Next morning the doctor gave each of us a hypodermic injection of morphia ; we vomited before that very frequently, though we had little or nothing on our stomach. I was also attacked with very severe diarrhœa, but this symptom did not manifest itself in the case of my cousin. The doctor further prescribed some large white pills (I think bismuth) of which I took a couple. After the hypodermic injection the vomiting and looseness of the bowels disappeared for the time, and I was thrown into a kind of stupor, which lasted till the afternoon when the former symptoms reappeared. We suffered greatly from nausea, vomiting, burning thirst, headache, and I from diarrhœa, which probably had been checked in my cousin's case by the quantity of opium taken the day before. That evening, I think, you were called in."

In obedience to a summons by telegram, I went to Stamford and I found Mr. H. just recovering from the effects of the last hypodermic injection, and greatly annoyed by an incessant nausea and tenesmus. He piteously implored me to relieve him and to administer another subcutaneous injection of morphia, but believing that all of the *materia peccans* had not been removed from the intestinal tract, and finding the patient possessed with a fair amount of strength, and with a pretty good pulse, I firmly refused to comply with his request, but, on the contrary, considered it my duty to aid nature in her efforts to eliminate the poisonous substances, which were still retained and kept up the gastro-intestinal irritation, by administering hot drinks and purgative enemata carried high up—which kept the patient almost all night vomiting and especially purging. With the thorough removal of the mushrooms the symptoms of gastro-intestinal irritation entirely and at once abated, and towards morning the patient was not only free from all danger and the distressing pains of the last two days, but bright and cheerful. The stomach having speedily regained its normal functions I was enabled to adopt an appropriate course of treatment, which resulted in the patient's rapid recovery of his previous health and strength.

Case II.—Far different, however, was the condition of the other patient, Mr. C., aged 24 years, a student of divinity, who was shortly to be ordained. My first impression upon seeing him was that he appeared to be doomed, alarming symptoms of collapse being apparent, such as I had frequently had occasion to observe in fatal cases of Asiatic cholera.

The face and entire surface of the body were bathed with a cold clammy sweat, the extremities were cold, the eyes deeply sunk in their sockets, the colour of the countenance ashy pale with livid contours around the lips and nose, the features pinched and shrunken, the pulse exceedingly weak and at times scarcely perceptible, the impulse of the heart faint, irregular, and intermitting, the respiration shallow, short, and oppressed, the intellect apathetic and obtuse, and the whole aspect of the patient that of a deep sopor from which he was occasionally roused by complaints of an excruciating pain in the epigastrium and an insatiable thirst.

The first indication to be fulfilled was, of course, the vital one to sustain the life that was fast ebbing away ; I, therefore, injected at once subcutaneously large quantities of camphor, ether, musk, and alcohol, applied artificial heat and rubefacients and excited the cutaneous surface by stimulating frictions, persevering in that course until a favourable reaction began to set in, and pulse, temperature, colour, countenance, and the mental complexion showed visible signs of improvement.

The imminent danger of fatal collapse having passed for the time, I turned my attention next to the neutralization and elimination of the poison. But my efforts in that direction were unfortunately rendered futile by the extremely irritable and intolerant condition of the stomach which caused the almost immediate rejection of even a teaspoonful of iced water or champagne.

The internal administration of tannic acid as a partially efficacious chemical antidote and of cathartics for the speedy removal of the poisonous matter from the alimentary canal being thus rendered impossible, I had to resort to rectal medication and purgative enemata, but met here also with considerable difficulty. For although making use of a long tube and carrying it high up into the colon the injected fluid passed off almost immediately, neither the medicated, nor the purgative and nutritive clysters were retained and the discharge of fecal matter was quite scanty. The bowels had not once spontaneously moved since the patient was taken ill, and all efforts of freeing the system from the poison by active purgation threatened to fail. Feeding and medication by the rectum were furthermore aggravated by the patient's exhaustion, as any long-continued change of position or brisk movements were apt to induce syncope and slight collapse accompanied with severe and painful vomiting.

In this emergency while nervous prostration, gastric inflammation and intestinal torpor stubbornly combined against the pursuance of a rational and radical mode of treatment, I resolved as my last resort to employ atropia subcutaneously. Although left in ignorance of the true character of the ingested mushrooms—whether merely bad and partly decayed or truly poisonous—and although the patients were in no condition to throw any light upon the matter, I had reason to suspect from the symptoms that presented themselves the ingestion of a fungus-poison. The purely gastro-intestinal disturbances of Mr. H. seemed to be due merely to unsound mushrooms, whereas, the predominant nervous symptoms in the case of Mr. C., with the alarming signs of coma and collapse pointed with almost positive certainty to the presence of a noxious poison affecting alike the central nervous system and the organs of circulation and respiration. Another marked and positive symptom of seemingly great importance, because common in cases of poisoning by fungi, was the considerable pupillary contraction, but that might also have been due to the large amount of opium taken internally and hypodermically before I saw the patient. Under all the circumstances, however, I was justified in suspecting the presence of a specific fungus-poison, and as all direct methods of treatment for the purpose of neutralizing and eliminating the same failed, I determined to test the efficacy of atropia as an antidote.

Schmiedeberg and Koppe had succeeded in obtaining from amanita muscaria a poisonous alkaloid—muscarine—closely resembling if not wholly identical in its toxic effects with the alkaloids gained from other fungi—such as bulbosine from amanita phalloides or agaricus bulbosus, the alkaloid obtained from boletus luridus, and others—and they further established by experiments upon animals the fact that atropia acted as a true antidote in cases of poisoning by muscarine.

Acting upon their suggestion, I injected in the first night, subcutaneously, one-fiftieth of a grain of the sulphate of atropia, and the effect of that dose seemed to be remarkable. Not only did the pupils speedily respond to the action of the drug, but the brain and stomach symptoms greatly improved, and the heart, lungs, and arteries exhibited more force and regularity in their functions. It is scarcely necessary to say that I, profiting by this experience, followed up this treatment during the next three days, and the very great improvement which took place within that time appeared in a large measure to be due to the atropia. The bowels and bladder, that had been absolutely torpid heretofore, acted now with greater force, rectal feeding and medication could be regularly conducted, the mind assumed a brighter and more cheerful complexion, the intellect regained its former clearness and vigour, and, apart from the gastric trouble, the patient did not complain of pain or distress. His weak and anæmic condition forbidding the application of leeches to the epigastrium, I had, almost immediately after taking charge of the case, commenced treating the acute gastritis with a large fly-blister, the ice-bladder, and absolute stomachal rest. No food or drink whatsoever, not even a small piece of ice, much as the patient begged and yearned for it, was allowed by the mouth; and that absolute prohibition of stomachal alimentation, perhaps more than the remedial measures employed, conquered not only all pain and nausea, but restored to the organ, after three days, so much of its strength and tone that small quantities of milk, gruel, champagne, and wine jelly were easily and painlessly retained. On the fourth day of my attendance, the 6th of September, after having spent three successive nights with the patient, he was able to sit up in bed, change his position, and even walk to a lounge without feeling any faintness, pain, and nausea; he did, in fact, so well that I could conscientiously suspend my visits altogether for a day or two, owing to urgent professional engagements in the city, and leave him in charge of a local practitioner. During my absence he got up several times, sat in an easy chair, ate with appetite, talked cheerfully, and even went down stairs upon the piazza—which was contrary to my strict orders—but, before he could reach his room again, was seized with nausea and pains in the epigastrium. These symptoms, however, were of short duration, and passed away under the careful observance of rest, a horizontal posture, and the treatment and regimen which I had prescribed.

On the 9th of September, the ninth day of the illness, I received a telegram hastily summoning me to the patient's bedside. In the morning he had been taken with a very severe chill, together with nausea and vomiting; and, when I saw him a few hours later, he was feverish, and partially delirious—temperature 105° F., pulse 135, and respirations 36. The breathing was short, rapid, and oppressed; and pressure upon the epigastrium, back, hips, and loins quite painful—so much so that the patient, although not perfectly conscious, moaned and cried while under examination. There was neither cough nor expectoration present, yet percussion and auscultation revealed beyond doubt the existence of a pneumonic infiltration of the lower and middle lobe of the right lung; and the suspicion of a complicating acute Bright's disease—croupous nephritis—first raised by the peculiar and characteristic pain in the region of the kidneys, aggravated upon pressure, was confirmed by an examination of the scanty, dark-coloured urine, which was of high specific gravity, and contained more than seventy-five per centum of albumen.

It is not my purpose to enter into a detailed report of the case as it progressed from day to day, and to reproduce the notes which I took, interesting and instructive as they might prove in connection with the first morbific cause; I shall, therefore, confine myself to a brief summary of the principal symptoms. With the advent of the pulmonary and renal troubles the acute gastric symptoms, which had greatly abated, gathered new force, and although not quite reaching their former intensity, the patient was only capable of taking and retaining very small quantities of food in solution, and in consequence of this disability of swallowing and digesting, the chief alimentation and medication had to be conducted by the rectum. The very high temperature prevalent on the first day of the relapse, yielded readily to large and repeated doses of quinia and digitalis; which remedies exercised, however, no other beneficial effect. Although the physical signs on percussion showed marked dulness, and the absence of the normal respiratory murmur, with slight crepitant and mucous râles, the local and usually obvious pulmonary symptoms were almost entirely masked—owing, no doubt, to the great depression and mental apathy of the patient. The disorder assumed the decided type of a typhoid pneumonia; the feverish flush of the face, so plainly marked in the beginning, making room to a livid and dusky hue, the skin being most of the time cold and clammy, and partially covered with petechiæ, the tongue coated with a dry, brownish-black fur; the gums, lips, and teeth incrusted with black sordes, the pulse growing steadily weaker, smaller, and more compressible, and the mental state more apathetic and obtuse. The liver and spleen were found to be abnormally enlarged. In spite of the frequent desire of micturition, the secretion of the urine was nearly suppressed, and as the bladder was wholly inactive, the water had to be drawn off by the catheter, and remained throughout scanty, dark-coloured, albuminous, and of a high specific gravity. The bowels also persisted in their torpid condition, and no defecation was obtainable without laborious and frequently repeated clysters. The most marked and distressing symptoms, however, were confined to the nervous system. I refer more particularly to a continual restlessness and insomnia, which baffled all treatment. Morphia, atropia, hyoscyamia, and chloral were employed singly and in combination, but produced no lasting and refreshing sleep; and the patient, while apparently and for a short time under the effect of a narcotic, would restlessly toss about and sigh, moan and mutter, as if in agony or under the dread influence of horrible dreams.

There were occasionally brief intervals of apparent improvement, during which the patient was perfectly rational, and even cheerful, displaying interest, expressing gratitude, and considerately appealing to his friends not to be too much concerned about him; but these periods of amelioration were but temporary, and not calculated to kindle any new hopes. Later on the obtuse condition of the intellect changed to a decided stupor, with low, muttering delirium. The patient was only with difficulty aroused, and appeared unwilling to be questioned, or in any way disturbed. Deglutition and rectal feeding and medication became almost impracticable, and life was chiefly sustained by hypodermic injections of cognac, camphor, and musk. On the 17th of September the patient was so greatly prostrated as to involve the probability of a speedy, fatal termination. Shortly after noon he lapsed into unconsciousness, and after remaining in this condition about an hour, with occasional glimpses of recognition of his physician and friends, the action of the heart grew faint, the pulsation at the wrist ceased, and he expired without the slightest struggle—calmly passing away.

Autopsy.—Thirty hours after death I made the autopsy in the presence and with the kind assistance of Drs. Geib, Lewis R. Hurlbutt, and Hurlbutt, Jr.

Rigor mortis not well marked; body greatly emaciated, and adipose tissue entirely wanting. The cutaneous surface presented a decided icterode hue, with large ecchymoses, especially on the posterior parts of the body. Both pleuræ were adherent throughout, but more particularly the right one. There was no effusion of serum. The lungs exhibited evidences of recent congestion and œdema, with softened and puriform infarctions scattered over their surface. The lower and middle lobes of the right lung were the seat of a hypostatic pneumonia, which had scarcely passed the stage of hyperæmia. The lung-parenchyma was dark, reddish-blue, congested, and partially gorged with blood, resembling in consistence and anatomical structure the spleen. There were here and there scattered very small, almost unrecognizable patches of red hepatization, which showed upon section a granular texture, and from whose alveoli oozed a lymphoid serum, slightly tinged by fibrinous coagula.

Heart enlarged, pale, and flabby; its cavities, especially the left one, considerably dilated, but walls not markedly hypertrophied. The mitral valve was swelled and thickened; the other valves, however, appeared perfectly normal; the right auricle was dilated, and so much attenuated as to be almost transparent. Liver and spleen were enlarged and congested; gall-bladder enormously distended, and filled with dark, concentrated bile. The stomach contained about an ounce and a half of a dark fluid, strongly smelling of musk, and was covered with a puruloid mucus, upon the removal of which there appeared a diffused congestion of the entire mucous membrane, with serous infiltration of the submucous coat. The congestion varied from a bright-red to a dark-livid, and even blackish-brown colour, and in those spots where the inflammation and discoloration were most intense the mucous membrane was not only softened, and could be readily detached, but the anatomical lesions penetrated to the submucous coats as if they had been produced by the chemical action of a slightly corrosive poison. Isolated ecchymoses were also apparent throughout the whole extent of the stomach.

The entire intestinal tract from the duodenum to the rectum bore evidences of congestion and inflammation; the mucous membrane was swollen, congested, softened, here and there covered with a layer of fibrinous exudation, and in other places even more thoroughly disorganized. There was scarcely any fecal matter present, and no traces of the ingested mushrooms could be detected.

The kidneys were abnormally large and swollen; the cortex grayish-white, pale, mottled with red spots, the capsule not adherent. The bladder was enlarged, and filled with about two ounces of a thick, milky fluid.

The brain and spine were not examined.

The necropsy thus fully confirmed the more or less active inflammation of the stomach and intestines produced by the direct toxication of the ingested mushrooms, and the complicating nephritis and pneumonia which owed their existence undoubtedly to the influence of the same noxious cause. That the dangerous collapse in the beginning of the patient's illness, together with the great prostration and exhaustion to which he finally succumbed, were chiefly, if not solely, due to the same *materia peccans*, seems beyond all doubt.

Having given a somewhat detailed account of the case with all its salient features, it is scarcely necessary to add any remarks, and to dwell any further upon the various points of interest. I would only lay particular stress upon the favourable action of atropia in such cases. To be sure, it did not prevent a fatal issue in this instance, because probably employed too late; but it nevertheless caused such a great improvement in all symptoms as to give rise to the hope of a favourable termination.

Article VII.

A Case of Basedow's Disease terminating in Total Loss of Sight from Inflammation of the Cornea. By Henry G. Cornwell, M.D., of Youngstown, Ohio, late Resident-Surgeon Brooklyn Eye and Ear Hospital.

Miss C. J., æt. 20, born in Scotland; delicate complexion, and light auburn hair; anæmic, very nervous, and with enfeebled intellect, came under the observation of one of the surgeons of the Brooklyn Eye and Ear Hospital (Dr. Arthur Mathewson, by whose kind permission I report the case), May 3, 1877. She was accompanied by a female friend from whom the following brief antecedent history of the patient, which I copy from my note-book, was obtained:—

"She has always been nervous and weak minded; is easily frightened, and starts at loud and sudden noises. Her eyeballs have protruded from the orbits as long a time as can be remembered. One night about four weeks before the date of this visit to the hospital, some of her companions at a charitable institution in Brooklyn, N. Y., put something into her bed, which caused her to be badly frightened. The next morning the eyeballs were found protruding from their socket to a much greater extent than they were before. The exophthalmos continued to increase within the succeeding two weeks. Some days it was noticed that the protrusion was not so great as on others. On the first of May the left eye became inflamed, and to-day, May 3d, she appears at the hospital."

The eyeballs were found to protrude to such an extent from the orbits that the lids would not cover the corneæ at all. The cornea of the left eye was slightly cloudy over its entire surface. There was also some swelling and œdema of the ocular conjunctiva. Both of these membranes were dry and very sensitive. Vision (left eye) = ability to count fingers at 120 c. m. (4 feet); (right eye) slight chemosis, cornea clear. Vision $\frac{\mathrm{XX}}{20}$. No ophthalmoscopic examination was made of either eye. No enlargement of the thyroid gland. Rapidity of the heart's action not observed at this time.

As local remedies vaseline was directed to be used in both eyes, together with a solution of atropiæ sulphatis (.25 c. g. aqua 32 grm.), and a borax and camphor bath; she was directed to return on the following day, but she did not put in an appearance until May 6th, two days after her prescribed time, when the chemosis of the left eye was very tense. The conjunctiva was dry and scaly in appearance, and so sensitive that when it was touched with a feather the patient would cry from the severity of the pain. The lower half of the cornea was yellow and horn-like; the upper half was cloudy as before. Vision = perception of light; the cornea of the left eye was at this time markedly cloudy; the chemosis tense, and the same dry condition of the cornea and conjunctiva manifested itself as in the fellow eye. Vision = ability to count fingers at 150 c. m. (5 feet). A more careful examination of her general condition was made at this time. Her nervous symptoms were more marked than when previously seen; she was hysterical, manifesting this condition in laughing, and crying most of the time. Her circulation was 130, which became rapidly increased after the least excitement. Temperature 102°. No swelling of the thyroid gland, and no organic disease of the heart could be detected.

She was admitted into the hospital, and the continuous use of hot water and the instillation of the atropia solution (for which eserin sulph.—.06 c. g. aqua 32 grm.—was substituted later), were ordered, together with tonics of iron and quinia, egg-nogg and nutritious diet. On May 8th the entire cornea of the left eye was yellow, dry, and shrivelled, and the cornea of the right eye was rapidly undergoing the same changes, and by the following morning (May 9th) the white cloud in the centre of the cornea was surrounded by a dry yellow ring about 3 mm. in width. Vision = perception of light. The globes underneath the lids were perfectly normal in appearance, not the slightest inflammation of the ocular conjunctiva existed posterior to the margins of the upper and lower lids.

A solution of muriate of quinia was substituted for the eserine. The use of the vaseline was continued, and an oiled-silk mask ordered to be worn, which gave her so much relief from the pain which the exposure of the eyes to the air occasioned that she cried when it was removed for any length of time. Fluid extract of ergot was substituted for the tinct. valerian and Hoffmann's anodyne. The ergot (Squibb's) was given in 4 grm. doses every two hours, which had the effect of reducing the cardiac pulsations from 130 to less than 100 a minute. The temperature fell from 102° to 100°. Whenever the use of the drug was omitted the temperature again rose to its original height (102°) with corresponding increase in the rapidity of the heart's action. Glycerite of starch was tried as a local remedy, but the vaseline was found to be better. On the following day the cornea of the left eye was dry and yellow. Same treatment continued. Two days later (May 12th) the appearance of the patient at this time was frightful. The lids of both eyes were forced widely apart by the protruding eyeballs. The lower ones twitched with great rapidity most of the time. The ocular conjunctiva of both eyes was dry and scaly; the chemosis was so great that an abrupt dark-coloured mound was formed around the cornea, overlapping its edge to quite a marked extent. She was very irritable. Her face and neck were red from the congested state of the vessels, and she sweat profusely most of the time.

One week later she was discharged. The globes were now softened, and the lids could be closed to such an extent that but a narrow space intervened between their edges. The intra-ocular tension was much lowered (T = —2). Her nervous irritability had by this time chiefly subsided. Circulation 130, temperature 101°.

Blindness from disease of the cornea as a sequel of Basedow's disease is a very rare occurrence. Most authorities in ophthalmology make but a passing reference to the few cases that have been reported, and regard the opinion advanced by Von Graefe, viz., that the diseased condition of the cornea is brought about by a paralysis of the "trophic" fibres of the ophthalmic division of the trifacial nerve as (with our present knowledge, which it must be confessed is yet vague of the nervous agency governing the nutrition of the eye) most worthy of acceptance. Soelberg Wells, in his "Treatise on the Eye," records but a single instance of blindness occurring in this disease coming under his observation, the patient being a young woman. Graefe, according to the same author, records fourteen cases, ten men and four women, in the *Berliner Klin. Wochenschr.*, 1867. Von Dusch gives in his *Lehrb. d. Herzkhtn.*, Leipzig, 1868, an analysis of fifty-six cases of the disease, in none of which was blindness the result. Emmert (*Archiv f. Ophth.*, xvii.) records twenty cases coming under his observation, in *all* of which there was diminution of the normal sensibility of the cornea only.

The experiments of Meissner (*Henle and Pfeuffer's Zeitschrift*, xxix.), and subsequently those of Schiff (*loc. cit.*) on rabbits have obtained as a result the belief that certain (the innermost) "trophic" fibres enter into the structure of the fifth nerve. On these experiments the opinion has been based (O. Wyss, Valentine, and others) that on account of the division of these (innermost) fibres the eye is less able to resist those changes which are brought about by its exposure to external irritants, the air, dust, etc., after complete division of the nerve by which the sensibility of the organ is lost. Graefe, after these experiments, believed that disease of the cornea as a sequel of Basedow's disease was due to paralysis of these "trophic" fibres of the ophthalmic branch of the trifacial nerve. The character of the destructive changes which take place in the cornea are described by Eulenberg in a paragraph which I reproduce from a paper on Basedow's disease under the head of "Vaso-Motor Neuroses" in Ziemssen's *Cyclopædia*, vol. xiv. p. 88:—

> "Another and a rarer group of symptoms must, perhaps, be regarded in some cases as secondary, as a sequel of the exophthalmos and the defective power to depress the upper lids. These symptoms are *disturbances of the nutrition of the bulb*, especially in the outer coats of the eye, the conjunctiva and cornea. The impairment of the power of moving the lid prevents the eye from receiving its due share of moisture, whence come dryness in the conjunctival sac, distension of the conjunctival veins and conjunctivitis. The lachrymal secretion is often increased. In the majority of cases nothing worse occurs; but in bad cases severe disturbance of nutrition of the cornea occurs, closely resembling what occurs in neuroparalytic ophthalmia, and perhaps explicable in the same way. The cornea first loses its sensibility; on its surface dry yellow spots appear, which gradually enlarge, and the final result is the formation of an eschar, followed by diffuse desiccation or even perforation. In other cases infiltrations occur at several points of the cornea at once, and ulceration or even perforation occurs. It is remarkable that these disturbances in the nutrition of the globe are

common in men (Basedow, Praël, Naumann, Von Graefe), although in a few instances also observed in women (Lawrence, Tatum, Teissier)."

It will be observed that the patient, whose history I have recorded, suffered very much from the sensitive condition of the eyes. She cried when they were exposed to the air for any length of time, or when they were touched with a feather. The inflammation was not of a violent character, but a drying or shrivelling up of these membranes—an acute xerosis. In this particular it will be noticed that it differs from that form of inflammation of the eye which ordinarily follows its exposure to external irritants, as after facial paralysis with consequent drooping of the lower lid, or retraction of one or both lids from cicatrices the result of burns, or from exophthalmos due to tumours or aneurisms of the orbit. In these later instances acute keratitis is developed with photophobia and profuse lachrymation, followed by sloughing of the cornea oftentimes, or dense pannus. Here the corneæ were dry and yellow; no loss of tissue was perceptible, and no sloughing. The membranes (the corneæ) were at first white, resembling ground glass, becoming subsequently dry and yellow. There was no anæsthesia of the eyeballs due to stretching of the ciliary nerves, and no paralysis of the extra-ocular muscles. No mention is made in my notes of the case of dilatation of the pupil, or loss of accommodation in the right eye before it became affected by the disease. If such changes were present, they would have been observed doubtless, and recorded, and yet the globes protruded from between the lids to such an extent as to be (in a profile view) half way out of the orbits. The ocular conjunctiva was chemotic and œdematous, the latter condition to a slight extent at the margins of the lids. Lachrymation was but slight, and no photophobia was present. The discharge was slight; the flakes of mucopus adhered to the convexity of the swelling.

We read at times of instances where after paralysis of the fifth nerve the cornea became affected, although the eye was protected by the falling of the upper lid (associated ptosis).[1] This is contrary to what usually occurs, as the experiments of Magendie and other vivisectionists, together with our subsequent clinical experience, have taught us. In rare cases we find no disease of the cornea, although this membrane is wholly insensitive from paralysis of the fifth nerve, and unprotected.

We must look for the cause of the corneal disease in the case I report in these two directions, viz.: (1) It was due simply to the exposure of the eyeballs to the air, and wholly disassociated from any affection of the fifth nerve or the ganglion of Gasser; or (2) The "trophic" fibres of the nerve were *alone* affected, and on this account the eye was unable to resist the injurious influences of the air, dust, etc.

The obviously neurotic character of the disease in this patient to my mind is worthy of consideration as offering a theory as to the cause of the destructive changes in the cornea. The reader will note these points by turning to the history of the case. The patient always nervous, starting at loud and sudden noises ; her feeble intellectual powers ; the *brusque* development of the exophthalmos after a fright at a comparatively trivial circumstance, together with her subsequent irritable and hysterical condition. Is it unreasonable to suppose that the primary exophthalmos was of neurotic origin, and that the protrusion of the eyeballs developed itself to a much greater extent after this fright from further changes taking place in the ganglion of Gasser (in this case the elements of the sympathetic perhaps being only affected) or in the fibres of the sympathetic nerve which are distributed to the eye, the "trophic" fibres of the fifth pair of nerves, as they are generally believed to be? The greater number (eight out of twelve) of the necropsies made in which changes were found in the cervical sympathetic forms a basis for such a theory.[1] The character of the destructive process which took place in this case is what we would more naturally expect to follow disturbances in the nutrition of the eye, rather than that which would follow its exposure to irritants alone. Eulenberg suggests (*loc. cit.*, p. 98) that it is not impossible that this condition should result from disturbances of innervation on the part of those sympathetic fibres which enter into the structure of the ophthalmic division of the fifth nerve. Stretching of the ciliary nerves had manifestly nothing to do with it, as the corneæ were sensitive, and morbidly so, as long as the patient was under observation. In Emmert's (twenty) cases the reader will observe that the sensibility of the cornea and conjunctiva was much lowered. This, according to authorities, is not the rule but the exception. I regret that the menstrual function of the patient was not made the subject of careful investigation. If I remember rightly, she stated that there was suppression of the menstrual flow, but I did not record it at the time ; she had a markedly chlorotic appearance, which improved under the tonic course followed during her stay in the hospital.

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[1] *Vide* Paralysis of the Trigeminus, followed by Sloughing of the Cornea, by William F. Norris, M.D.; Amer. Journ. Med. Sci., Jan. 1872, p. 80.

The case presented one other feature of interest, and that was the absence of enlargement of the thyroid gland. This was observed by Von Dusch in three of fifty-six cases.[2]

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[1] Observed by Trousseau, Reith, Cruise, McDonnel, Traube, Biermier, Virchow, and Geigle ; not recognized by Recklinghausen, Paul, Fournier, and Ollivier.

[2] Accelerated action of heart, absent in 3 cases.
Goitre . . . . . " 3 "
Exophthalmos . . . " 4 "
In the order of their development—Lehrb. d. Herzkhtn., 1868.

ARTICLE VIII.

EXPLANATION OF A SIMPLE METHOD FOR THE DIAGNOSIS OF ORGANIC VALVULAR DISEASES OF THE HEART.

By F. PEYRE PORCHER, M.D., Professor of Materia Medica and Therapeutics, Medical College of the State of South Carolina; Associate Fellow of the College of Physicians of Philadelphia.

AFTER a prolonged study of diseases of the heart at the bedside, and as a teacher of clinical medicine, we have arrived at a generalization which is of great practical use, and which we have taught to classes for many years. From a careful examination also of the principal authorities no flaw can be detected in the very brief table, or formula, which embodies the generalization. It is characterized by exceeding simplicity, it is competent to the unravelling or interpretation of every uncomplicated case of valvular disease—for its merits are intrinsic, being based upon the relations existing between the mechanism and functions of the organ. The table is of instantaneous applicability and can be used by any one.

With our own experience of the difficulty of retaining at all times in the mind the structure, complex operation and functions of the several chambers and valves of the heart, and the nature and cause of the modifications of the sounds they give forth when diseased, we will make no apology to our learned friends, whilst endeavouring to present a clear and simple exposition of the subject, for the statement or repetition of an occasional truism, or a very elementary and well-known fact. The heart, as every one knows, is a complicated machine of exquisite construction, with four chambers and two sets of valves—which sometimes works for a century without repair; yet its mechanism and functions as a great receiving and driving engine—in its healthy action as well as for all purposes of the pathologist—*can* be grasped and understood by the mental eye if close attention be given to the subject. This must be attained as a preliminary step by any one who pretends to pronounce upon its pathological changes. Let any one attempt to explain all this to others, to a class of students for example—specially those who are not thoroughly grounded in the anatomy and physiology of this viscus—and he will soon know how difficult is the task, how confusing often becomes his efforts at description, how fugitive is the impression produced, and how few are enabled to apply practically what they have even thoroughly understood. Diverse and diametrically opposite operations have to be appreciated and retained at the same time in the mind, and, as in the study of descriptive geometry, the imaginative faculty also has to a certain extent to be called to aid our comprehension.

We will make no allusions in this paper to hypertrophy, dilatation, pericarditis, or other diseases of the organ.

It is almost needless to say that the first effort of one who is desirous of knowing whether the valves and orifices of the heart are diseased is, obviously, to notice if there be any *derangement*, *aberration*, or *change* from the *normal* sounds! He takes care to listen at the *base* and at the *apex*, paying *separate* attention to each point respectively; and also to the condition of the right and the left cavities,—in order if he does discover any *morbid* sounds (a modification of the natural being always a morbid sound), that he may isolate and designate the derangement or lesion which such morbid sound surely indicates. It simplifies the process very much to know that far the greater number of endocardial lesions or injuries (it is needless to give the figures) are found in the *left* cavities. He should keep in mind also that the structure of the valves or curtains at the *base* of the heart (the semilunar or sigmoid valves of the aorta and pulmonary artery) are analogous in shape, and act similarly and simultaneously. They are placed at their respective gateways with similar intent; they close and open, give ingress and egress to the column of blood synchronously. The same is true of those at the point or *apex* (the bicuspid or mitral, and the tricuspid). These, placed between the left and right auricles and ventricles respectively, differ essentially in form and structure from those at the base of the organ,—but they resemble *each other* in their general shape; *they* also open and close simultaneously, and perform analogous functions with each other in the economy of the organ. So, in making a diagnosis in the case of a heart supposed to be diseased, we address our examination to, and fix our mind upon these *two sets* of valves separately, to see if any of them are diseased, and if so, to note: both what is the nature of the change which exists in their own structure, and what modifications have been produced by their alteration of form upon the *orifices* which they close and open. This essential method of procedure (coupled with the statement made above regarding the very marked *infrequency* of diseases of the right cavities), already greatly simplifies the study of the diseased valves. It is practised even by the novice in such inquiries; and when one is seen examining the heart at random—regardless of the above rule, it is clear to the looker-on that he has not mastered the first horn-book lesson upon the subject,—and that it is impossible for him to form any accurate conclusions. He may know that the organ is diseased, but he cannot tell where the injury is.

Besides this, whoever is desirous of investigating a case of heart disease, must have in addition to his anatomical knowledge, fully and clearly in his mind the whole action and re-action in the cavities of the organ during its systole and diastole; he must know when and where the current is flowing out, and when and where its passage is estopped—whether at the back-gates, or at the front-gates, and conversely. For, it is when those muscular and tendinous strings and cords at the apex, or those semilunar curtains at the base—which open and shut these orifices, are defective, *i. e.*, when they close imperfectly, are *deficient* ("*insufficiency*")—and permit regurgitation when they should not; or when by fibrinous or other deposits upon the valves the orifices are *narrowed* or *roughened* ("stenosis"), and thus *obstruct* the forward flow, and give rise to abnormal, morbid sounds—it is the consideration and explanation of this problem which is his object in every case which becomes the subject of critical inquiry.

It is essential then, that besides a full appreciation of the currents and checks in the incessant working of the organ—the onward flow and the movements of the fleshy barriers which suddenly and rhythmically arrest the flow,—he should first *know* the normal *healthy* sounds, in order to detect the slightest *deviation* from them; and he should localize these deviations—for they are necessarily *morbid* sounds, and *indicate diseased valves.*

It being necessary then for the observer to know the cause and rationale of the normal sounds, we will state them. It is pretty well agreed that the first sound (represented by the word "lubb") is synchronous with the *systole* of the organ, and is owing to one or all of three causes: viz., the contraction of the muscular ventricles, the sudden closure of the auriculo-ventricular valves which prevents the blood from regurgitating into either auricle, and the impulsion of the heart against the walls of the chest. At this moment a column of blood is driven forcibly through the aorta and pulmonary artery, and the auricles are silently filling with blood from the valveless venæ cavæ and from the pulmonary veins.

That the second sound (represented by the word "dup") is synchronous with the *diastole* of the organ, and is due to the shutting up of the aortic and pulmonary artery semilunar valves. The closure of these valves at this moment prevents the regurgitation of the blood from the aorta and pulmonary artery into the ventricles—when during the diastole of the ventricles these are being filled from the auricles.

During the prolonged interval of rest following (which is equal in duration to the 1st, and twice the length of the 2d sound), we may suppose that the auricles are still silently pouring their contents into the ventricles—the portals of which are now wide open. During this period of apparent calm the heart—endowed with a high degree of nervous energy derived from the cardiac ganglia of the sympathetic and the pneumogastric, wound round and enwrapped with bundles of concentrically interlaced muscular fibres, layer upon layer as if encased with triple steel, and indeed the very "cunningest pattern of excelling nature" as respects endurance, strength and force—is preparing, like a wild animal gathering for its spring, for the next systolic paroxysm when its contents will be forced into the delicate meshes of the lungs, and be driven through the finest capillary tubes in the remotest tissues of the organism.

We will confine our attention at present whilst attempting to describe the *morbid* sounds and the lesions they indicate, to what takes place in the left cavities,—for whatever is true of the left is true of the right so far as the circulation of blood is concerned—and we will simplify matters much by so doing.

Now with the first sound (systolic) the blood is being driven through the opened aortic orifice—at which moment the back-gate (the mitral or bicuspid) is shut. So, if we have a deranged or abnormal *first sound* heard with the greatest intensity at the *base* of the heart (and it is not a soft, inorganic, anæmic murmur, which is owing to the thinness of the blood, and which is out of the present question), there is necessarily a narrowing (stenosis) or roughness of the aortic orifice,—an obstruction there by vegetations, atheroma, or other morbid condition preventing the natural flow of blood through the aortic orifice, and deranging or modifying the natural sound.

Hence a deranged first sound at the *base* of the heart indicates *narrowing* or obstruction—*stenosis*, in other words, of the *aortic valves.*

But suppose this abnormal, morbid *first sound* has its greatest intensity at the *apex* of the heart. It must be owing to this fact: that the back-gate has a chink in it—it is more or less open, in place of being tightly closed as it should be; the column of blood instead of meeting with the normal resistance of the closed and perfect mitral valve (bicuspid), in order that it may be propelled through the aorta and reach the utmost boundaries of the tree of life—it is leaking back through the defective portals of the mitral,—it is regurgitating into the left auricle; and it gives out to the ear placed over the apex a morbid murmur, or noise, more or less *prolonged*, in place of the ordinary normal first sound (represented by the word "lubb"). The valve is necessarily defective as a flood-gate; it is incapable of close shutting up; that its mechanism has become defective is indisputable, and we pronounce positively upon the subject.

So a deranged first sound at the *apex* indicates *insufficiency* of the mitral valve, caused by vegetations, or other result of endocarditis.

We have now disposed of derangements or abnormalities (which are always *morbid*) of the first sound of the heart both at the base and apex. They indicate nothing else but what we have said that they do.

Let us now proceed to pronounce upon derangements or abnormalities of the second sound (diastolic), should they be noticed either at base or apex: If the second sound is deranged, its greatest intensity or disturbance being at the *base* of the heart, it must necessarily indicate the exact opposite condition to that which we stated that derangements of the first sound indicated—for exactly the reversed condition of affairs is taking place; the semilunar valves are shutting now—they were open then. The valves at the base are acting directly contrary to those at the point also; when one set are shut the other set are open.[1] During the second sound we know that the aortic valves are closing, in order to keep the blood temporarily from flowing backward into the left ventricle (which is a reservoir of supply). So if there is a morbid second sound (diastolic) at the base the valves of the aorta are *insufficient*. The front-gate has not closed tightly, there are vegetations, hardened *plaques* of fibrine, or bone, or cartilage, which interfere with the integrity or pliancy of the delicate curtains which form this front flood-gate; and the column of blood in the aorta instead of remaining quiescent for a moment, as it should and does do in a state of health, some of it regurgitates into the dilating ventricle and gives a deranged, morbid second sound.

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[1] A third well-known relation may very properly be stated here to complete the sketch of these antagonisms and contrasts. This regards the cavities of the organ. The ventricles and auricles are synergetic only with themselves; when the former are contracting the latter are dilating, and *vice versa.*

Therefore a morbid *second sound* at the *base* indicates *insufficiency* of the aortic valves.

Now suppose the deranged, morbid second sound has its seat of greatest intensity at the *apex*, instead of being at the base; it is very plain then that the back-gate, the mitral or bicuspid orifice, is narrowed, obstructed (stenosis), and the blood in passing through makes a noise. Because during the second sound (diastolic) the mitral orifice should be wide open to allow the blood from the auricle to enter noiselessly and fill up the ventricle, otherwise there would be no supply for the next systolic effort of the heart. If the orifice is obstructed or narrowed the blood does not pass through noiselessly as in a state of health; the second sound is abnormal; there is a murmur.

A disturbed second sound at the *apex* indicates then *stenosis* of the mitral orifice.

Our table now is very easily constructed, and being based upon eminently natural and scientific foundations, namely, the physical laws of the heart's structure, functions, and actions, it must serve as a ready method enabling us, or any one else—even the most uninstructed,—to make a diagnosis of all the uncomplicated organic diseases of the valves at the orifices of all the chambers of the heart. As it is necessarily true and correct, and though it may seem very simple, it requires no thought to apply it to any case before us; nor that we should at the time of applying it understand *why* it is correct.

The formula and the order of the words to be recalled are:—

Stenosis.
Insufficiency.

Insufficiency.
Stenosis.

For example:—

At the base
- A deranged 1st sound indicates *Stenosis* of the aortic, or pulmonary artery valves.
- A deranged 2d sound indicates *Insufficiency* of the aortic, or pulmonary artery valves.

At the apex
A deranged 1st sound indicates *Insufficiency* of the bicuspid, or of the tricuspid valves.
A deranged 2d sound indicates *Stenosis* of the bicuspid, or of the tricuspid valves.

All we have to do is to memorize these words in their order, as a formula, to elucidate at the bedside the valvular diseases of the heart. Observe what sounds are deranged at the base, then at the apex, and pronounce accordingly. Of course the known relative positions of the four valves must guide us in deciding which of the two valves at the base, or at the apex, the abnormal murmur proceeds from, so as to distinguish between the valvular derangements of the right and left heart.

Of course Hoppe and Niemeyer, Skoda, Tanner, and Da Costa, the Flints, as well as D. H. Tucker,[1] and David Wooster,[2] in their admirable medical journal articles, and T. G. Thomas in his chart,—all these and other writers, not only present in the main and with greater or less lucidity and clearness the principles and facts referred to above; but none of them, we believe, have isolated and placed in so compact and simple a shape—to be readily remembered and used—the generalization we have formulated above.

We would like to enrich this paper by adding some selections, in the shape of aphorisms for practical use, from the copious abstracts we have made during many years past from different authorities, specially those culled from Hoppe's work; for we feel sure that their reproduction here would be of use to those who are desirous of perfecting their means of diagnosis,—but want of space forbids.

ARTICLE IX.

LATERAL LITHOTOMY, WITH THE SUCCESSFUL REMOVAL OF A CALCULUS AND SEVEN PIECES OF NECROSED BONE FROM THE BLADDER OF AN INDIAN SCOUT, NINETEEN MONTHS AFTER THE RECEPTION OF A GUN-SHOT WOUND.

By J. M. BANISTER, A.B., M.D., Assistant-Surgeon U. S. Army, Post-Surgeon Fort Reno, Indian Territory.

CHAUCH (or "Chalk," as he is commonly called), an Arapahoe Indian, 30 years of age, while acting as a scout for U. S. troops from Fort Reno, I. T., was wounded in battle with the Northern Cheyennes, near Fort Supply, I. T., September 13th, 1878. After the fight, the wounded were taken to Fort Supply, where this Indian was admitted to the Post Hospital, coming under the charge of Assistant-Surgeon T. E. Wilcox, U.S.A., who made, at the time, a detailed report of the case to the Surgeon-General. Assistant-Surgeon Wilcox gives me, in a private letter, a condensed account of the case while the patient was under his charge, and from this letter I make the following extract:—

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[1] Gaillard's Richmond Med. Journ., Jan. 1868.

[2] Canada Med. Journal.

"You must have heard from eye-witnesses of the extraordinary bravery of Chalk in the battle, in which he received his wound. I need not describe the seat of the wounds, as you have their cicatrices before you. The ball, after penetrating the saddle-tree, entered the right natis, passed through the pelvis, wounding the rectum and bladder, and made its exit just beneath the left pubic arch, carrying away a small portion of the arch, and wounding the left epididymis and scrotum. He was admitted to hospital at Camp Supply on September 15th, 1878, having been brought to the Post on a travois. For many weeks feces and urine passed through the posterior wound, or wound of entrance. There was a little infiltration of urine into the scrotum, and it was at one time enormously distended with fecal gases. Splinters of bone were discharged or extracted, from time to time, from the wounds of exit and entrance, and on one or two occasions fragments of wood were expelled per urethram. His treatment was supporting and antiseptic. The bladder was frequently washed out with a solution of carbolic acid (1 to 40), and borax and salicylic acid; thymol was also used. Gouley's "double (silver) catheter" was used when the bladder was irrigated. The urine, which was loaded with pus, blood, and phosphates, finally became normal; vesical irritation ceased; all wounds healed; urine was retained without difficulty; feces passed per anum, and the patient regained his flesh and strength. I was *never able to detect any foreign body in the bladder.*"

In January, 1879, the patient left Fort Supply, returning to his tribe greatly improved. In the following July, he came under the observation of Dr. L. A. E. Hodge, Physician to the Cheyenne and Arapahoe Agency, near Fort Reno, I. T. Dr. Hodge has kindly furnished me with the following condensed report of the case:—

"Chauch came under my notice during the latter part of July, 1879. The patient at this time was suffering from a very obstinate cystitis, the result of a gunshot wound of the bladder. The ball entered posteriorly, passing through the sacrum and bladder, and making its exit through the scrotum. When he came under my observation, the wound posteriorly had entirely closed. The patient complained of intense pain in the region of the bladder, and passed more than the normal amount of urine, which occasionally contained pus, and numerous small fragments of bone, one of which, upon one occasion, I removed with a small pair of forceps, it having become lodged near the meatus. The patient voided all his urine by the urethra while under my care, and seemed to suffer intense pain during micturition, a resort to the catheter being frequently necessary in order to properly empty the bladder. The treatment was purely palliative."

Upon February 29th, 1880, this Indian was admitted to the Post Hospital, Fort Reno, I. T., coming for the first time under my observation. The site of the cicatrix of the wound in the right buttock was a point two inches above the tip of the coccyx, and three-fourths of an inch to the right of the median line; the cicatrix in the left side of the scrotum was also well marked. When admitted the patient was in a very feeble and pitiable condition, having been bedridden for months, and his whole appearance bespoke great and prolonged suffering. He was a constant sufferer from pain in the bladder, in the site of the old wound in the right buttock, and along the course of the great sciatic nerve of the right side, and was labouring under a very distressing case of chronic cystitis; there was also excessive irritability of the bladder, the patient with great difficulty retaining his urine, the acts of micturition being very frequent, and, in the intervals, the urine dribbling continuously through the urethra, so as to render the constant use of a urinal necessary. He passed several gallons of urine in the twenty-four hours, a bucket, holding two and a half gallons, frequently, being twice filled in that time; his thirst was intense and insatiable. According to the patient's own account, he had been in the habit of passing such a large amount of urine for some months before entering the hospital. The Agency physician mentions, in his report before given, that an abnormal amount of urine was habitually voided when the patient came under his notice in July, 1879. This urine was of low specific gravity; strongly alkaline in reaction; of an ammoniacal odour; contained no trace of sugar; contained pus and mucus, and frequently small fragments of dead bone; was frequently tinged with blood, evidently of urethral origin, but, strange to say, showed no trace of phosphates upon careful examination. The chief suffering from the time of his admission to this hospital, until the operation, was caused by the almost continuous passage per urethram of small jagged pieces of necrosed bone, each act of micturition giving him great agony. Upon one occasion a piece, larger than usual, was several days in passing from the bladder to the fossa navicularis, where it lodged, and its removal by the knife and forceps became necessary. He would sometimes pass as many as six or seven small bits of bone in one day; these little fragments were generally not expelled from the urethra by one act of micturition, their progress being slow, several hours frequently being the time required for their passage through the whole length of the urethra. The urine was frequently tinged with blood, from the constant wounding of the lining membrane of the urethra. Suspecting the existence of some foreign body in the bladder, I was desirous of making the necessary examination at once, but was deterred by the excessive irritability of that viscus, as well as that of the urethra, every attempt to introduce the sound into the urethra causing the patient intense pain. Hoping for improvement in his condition, I postponed the examination for some time, but, finding the patient steadily growing worse, I determined to explore the bladder at once, so upon April 11th he was etherized, and the sound introduced. As soon as the instrument entered the bladder, I detected the presence of a calculus, and the existence of a foreign body being thus demonstrated, the examination was not continued further, as, on account of the irritability of the viscus, I was unwilling to prolong the exploration. Ever since his admission the patient had been under the best preparatory treatment for the operation now determined upon as a last resort, and this was continued until April 25th, when, at 2 o'clock P. M., I began the operation of lateral lithotomy, being assisted by Acting Assistant-Surgeon W. W. Hall, U. S. A., and Dr. L. A. E. Hodge, Physician to the Cheyenne and Arapahoe Agency.

By this operation I removed from the bladder a calculus and seven pieces of necrosed bone. The operation was necessarily prolonged for reasons presently to be stated. Ether was the anæsthetic used. Upon introducing my finger into the bladder, after making the deep incision, I at once discovered the calculus in the fundus of the viscus, and, in its neighbourhood, a mass of some foreign matter adherent to the bladder wall, which afterwards proved to be necrosed bone. The calculus was readily removed with the forceps, but it required some time to effect with my finger the separation of the pieces of bone from the wall of the bladder, their removal, then, through the perineal incision being comparatively easy. After carefully washing out the bladder, by which means were removed a number of bits of bone, similar to those the patient had been in the habit of passing per urethram, I made a careful exploration of its cavity with my finger and the "searcher," discovering up behind the symphysis pubis an encysted body, which I supposed to be another calculus. This body seemed to be somewhat egg-shaped, the base and body being firmly encysted, the apex free, and to the fingers and the "searcher" manifesting the characteristics of a calculus, being smooth and firm to the touch, and giving a *sharp*, *clear* "*click*" when struck with the steel instrument. Every legitimate effort to remove this body proving fruitless, I was at length compelled to leave it *in sitû*, and conclude the operation, which, from the length of time required to separate the pieces of bone from the wall of the bladder, and from my justifiable efforts to remove the encysted stone, had already been much prolonged. The dimensions and weights of the calculus and bones were as follows: the *calculus* was somewhat the shape of a triangular prism, which, when placed upon its base, was one inch in length, half an inch in breadth across the base, and three-fourths of an inch in altitude. It weighed, the day after the operation, 90 grains Troy. This calculus was phosphatic in character, and had no appreciable nucleus. The largest piece of bone was somewhat square in shape, being one and one-fourth ($1\frac{1}{4}$) inches in length, and seven-eighths ($\frac{7}{8}$) of an inch broad, and one-quarter ($\frac{1}{4}$) of an inch thick, in its thickest portion; its weight was 55 grains. The second piece in size weighed 35 grains, and the five smaller ones, collectively, 17.5 grains. These pieces of bone were in parts encrusted with a thin layer of phosphates, and upon their exposed surfaces could be seen crystals of ammonio-magnesian phosphate. The treatment, both before and after the operation was, in general, that usually followed in such cases, and hence needs no description. After the operation the patient advanced steadily to recovery from its effects, without an untoward symptom with the exception of a slight intercurrent attack of pleuritis, which began on April 30th, the sixth day after the operation, in a few days, however, readily yielding to treatment, the temperature during the attack never exceeding 99.8° F. The following is the record of the temperature and pulse, taken each day at 7 A. M., 12 M., and 7 P. M., for the four days immediately following the operation:—

	7 A. M.		12 M.		7 P. M.	
	Temp.	Pulse.	Temp.	Pulse.	Temp.	Pulse.
April 26th.	100 ° F.	108	102 ° F.	112	102 2° F.	106
" 27th.	100.6° F.	90	100.3° F.	96	100.5° F.	102
" 28th.	100 ° F.	88	100.6° F.	94	99.8° F.	86
" 29th.	98.3° F.	74	99.9° F.	86	99.5° F.	74

After the 29th inst. the temperature was never higher than 99.8° F., reaching this point only on two occasions, during the slight attack of pleuritis above mentioned, and the pulse never more frequent than 92. The patient has now (June 5th) entirely recovered from the operation; the perineal incision has healed; he is gaining flesh and strength; has a fine appetite; is in good spirits, and looks an hundred per cent. better than when he entered the hospital. Since the operation his chronic cystitis has greatly improved, the patient now having almost perfect control of the bladder, and not being troubled with the continuous dribbling of urine as before. He sometimes suffers slight pain in the site of his old wound in the right buttock, and over the sacrum. There are no signs of a rectal stricture. He has passed no more bone per urethram, except on the morning after the operation, when a small piece, which I think must have been in the urethra at the time of the operation, was voided with his urine. The quantity of urine voided in the twenty-four hours has, since the operation, been steadily decreasing, the average quantity voided in this period, during the latter part of May, being twelve pints five ounces, and at the time of this writing (June 5th) seven pints five ounces. This urine is still alkaline in reaction, and has yet an ammoniacal odour, but is not so offensive as heretofore. Its specific gravity is 1007, and it contains no phosphates and no trace of sugar. The abnormal quantity of urine, habitually voided, has frequently led me to suspect the existence of "diabetes insipidus," but I think now that the immense quantity of water the patient has been in the habit of drinking, to relieve what he termed the "hot feeling," has had a great deal to do with it, the voiding of such a quantity of urine being the consequence of the greatly increased ingestion of water. Although this may be true, nevertheless, the persistence of such an abnormal discharge of urine points to a pathological condition of the kidneys. The patient is now able to walk about the hospital on crutches, his chief inconvenience being the weakness of the lower extremities naturally following so many months spent in bed; *before* the operation, any extensive movement of the body would cause him great pain in the bladder. The patient also experiences some trouble from the encysted calculus, complaining of a feeling of soreness over its situation, behind the symphysis pubis.

Upon July 18th, the patient returned to his people comparatively a new man. For several weeks before leaving the hospital, he was in the habit of making, with the assistance of crutches, an almost daily visit to an Indian camp about three-quarters of a mile from the Post, returning in an hour or two in nowise inconvenienced by his exertions. Since returning to his tribe he has married again, and I have learned upon inquiry that his sexual functions are uninjured. The control over his bladder is now perfect.

This case is, without doubt, one of the most remarkable in the annals of surgery. How this Indian, having received such a wound—the sacrum being perforated, the rectum badly involved, the bladder mutilated, and the os pubis wounded—could, after so many months of agony immediately preceding an operation of such gravity as that detailed above, come to the operating table with every chance against him, and then survive such an ordeal, and recover from its effects, is indeed wonderful. A point of the greatest interest in connection with the case, is the *passage per urethram of splinters of wood*, as reported by Assistant Surgeon Wilcox. The ball, before entering the body, passed through the saddle-tree, the patient being mounted at the time, and the splinters were evidently from this source, being driven into the body by the impetus of the ball, and probably accompanying it into the bladder, though possibly being left in the wound and afterwards effecting their entrance into the viscus by ulcerative absorption. Be this as it may, the splinters certainly made their entrance into the bladder and were discharged *per urethram*, and this fact alone would mark the case as unique. Instances of pieces of wood being driven into the bladder by projectiles are undoubtedly on record, but I have failed to find recorded, and that too after careful search, a single case in which such splinters were eliminated by the natural channel.

Another point of interest is the passage for so many months of *pieces of necrosed bone through the urethra.* The passage of these little fragments, after the patient came under my charge, was almost continuous, and from the patient's own account, and the report of Dr. Hodge, above given, these little bodies had been giving him great and almost constant pain for many months before I saw the case.

In the "Medical and Surgical History of the War of the Rebellion" (see Part II. Surgical Volume, Chapter vii., Section ii.) quite a number of cases are on record in which pieces of bone were passed through the urethra; but cases in which the passage of such fragments persisted for so long a time, as in the present instance, are few indeed—only three, or at most four, being recorded in the above-mentioned "Section." In one of these recorded cases (Case 808) pieces of bone were passed per urethram for *eleven months;* in Case 819 for *twenty-two months,* and in Case 817 such fragments are reported as still passing *eight years* after the reception of the wound. In the case reported in this article bits of bone passed almost continuously for many months, it not being possible to ascertain the exact length of time, but probably for a year or more, as their passage seems to date from a short time after the patient left Fort Supply, in January, 1879, and continued until April 25th, 1880, the day of the operation. Moreover, the case is interesting from another fact—the unusual size of the two largest of the pieces of bone removed by the operation; their weights and dimensions have already been given. These fragments, evidently from the sacrum, had undoubtedly been in the bladder for months, as they were partially encrusted with phosphates, and the patient had, for a long time, been suffering from symptoms referable to them. They must have made their entrance into the viscus by ulcerative absorption, since Assistant Surgeon Wilcox, in his report already given, states that while the patient was under his charge he was never able to detect any foreign body in the bladder.

There is nothing remarkable about the formation of the phosphatic calculus, as deposits of phosphates in the bladder after gunshot wounds of that viscus are often found (see "Medical and Surgical History of the War of the Rebellion," Part II. Surgical Volume, Chapter vii., Section ii., page 276), but it is indeed strange that it should have been formed with no foreign body as a nucleus, when there were so many pieces of bone in the bladder at the time of its formation. The pathological specimens removed by the operation have been donated to the Army Medical Museum, their numbers being 7020 and 7021 in the "Surgical Section."

ARTICLE X.

LOCALIZED TUBERCULAR PLEURISY. By FRANCIS DELAFIELD, M.D., Adjunct Professor of Pathology and Practical Medicine in College of Physicians and Surgeons, New York.

PLEURISY is one of the regular complications of chronic pulmonary phthisis. Very frequently this pleurisy is not accompanied by the presence of miliary tubercles in the costal pleura; in the pulmonary pleura they are more common. In acute general tuberculosis miliary tubercles are very frequently found in both the pulmonary and costal pleura, but the ordinary products of inflammation—pus, fibrin, and serum—are not present in any large amount.

There are still other cases in which there is pleurisy with the production of serum, fibrin, and pus; and, in addition to these, the development of miliary tubercles in the pleura, while chronic phthisis and general tuberculosis are absent.

Five such cases have fallen under my observation:—

CASE I.—Male, æt. 55; Ireland; clerk. About five months before his death the patient began to suffer from dyspnœa on exertion, and to cough with white and yellow expectoration. He gradually lost strength, but did not lose his appetite, and did not emaciate; nor was he confined to the house. He came under observation six weeks before his death. At that time there were physical signs of pleurisy, with the effusion of serum on the right side, the pleural cavity being about two-thirds full. The man's general condition was good, and he was not confined to bed. His temperature varied from 96° to 102° F., with an habitual exacerbation in the evening. On the day before that on which he died the temperature was 98° in the morning, and 99° in the evening. His pulse varied from 90 to 120, and was of fair strength. On the day before that on which he died the pulse was 130 in the morning, and 120 in the evening. The urine was normal. The right pleural cavity continued to be nearly full of fluid, but the man's general condition improved until he died suddenly, while in bed, at four o'clock in the morning. The *autopsy* was made eleven hours after death. The brain was not examined. The heart was empty; its valves and walls were normal. The liver was somewhat enlarged and congested. The spleen was of ordinary size and congested. The kidneys appeared to be normal, except for a marked venous congestion. The stomach and intestines appeared to be normal. The right lung was compressed and unaërated; the pulmonary pleura was coated with fibrin; at the apex of the lung was a little old fibrous tissue. The left lung was in the condition of general emphysema; the bronchi contained muco-pus; at the apex a portion of the lung as large as a turkey's egg was in the condition of red hepatization. The left pleura was normal. The right pleural cavity was nearly full of reddish serum. The costal pleura was thickened and coated with a very thin layer of fibrin. The pleura was markedly thickened, of a bright red colour, and thickly studded with small white bodies, rather smaller than a pin's head.

CASE II.—Female, æt. 17, German. Mother and two brothers died of pulmonary phthisis. The patient's health had been good until about four months before her death. At that time she began to cough, and after two weeks suffered from hectic fever, night sweats, and dyspnœa. These symptoms—the cough, scanty expectoration, the dyspnœa, and the hectic fever—continued, and the patient gradually lost flesh and strength. I examined her chest about three weeks before her death, and at that time there was flatness on percussion over the whole of the right lung both in front and behind, with absence of voice sounds and of respiratory murmur. The heart was displaced to the left. A few days later 30 ounces of purulent serum were drawn off from the right pleural cavity. After the tapping she was better for a few days; then the dyspnœa returned, became more urgent, and she died. The *autopsy* was made about six hours after death. The body was considerably emaciated. The brain was not examined. The heart was displaced to the left; its valves and walls were normal. The right pleural cavity was half full of purulent serum. The costal pleura was coated with a thin layer of fibrin. The pleura itself was thickened, and had the ordinary appearance of the pleura in empyema; no tubercles could be seen with the naked eye. The right lung was compressed against the vertebral column, and adherent at its apex. The lung tissue was compressed and unaërated; in it were a number of cheesy nodules larger than a pea in size; at the apex was a cavity as large as a pigeon's egg. The left lung at the apex contained a little dense, pigmented, fibrous tissue. Scattered through both lobes were small, whitish spots from the size of a pin's head to that of a pea—none of them cheesy. The liver, spleen, and kidneys were normal. The stomach and intestines appeared to be healthy, except for an increased amount of mucus at the pyloric end of the stomach and in the duodenum.

CASE III.—Female, æt. 20. Mother died of pulmonary phthisis. Patient was in good health until four months before her death. At that time she had a miscarriage. After the miscarriage she continued to lose blood from the uterus; she had pain in the lumbar region, and became weak and emaciated. Three months before her death she entered a hospital. At that time her pulse and temperature were normal, and she was put under treatment for sub-involution of the uterus. The treatment consisted in washing out the cavity of the uterus with a solution of iodine. This treatment was continued until fifteen days before her death. At that time she began to have pain over the lower part of the abdomen, and within three days she presented all the symptoms of general peritonitis. Four days before her death her chest was examined, and it was said that there was a friction sound over the lower lobe of the right lung, and that on the next day there was dulness over the same region.

The *autopsy* was made six hours after death. The body was emaciated; the abdomen much swollen. The brain was not examined. There were old adhesions over the left lung. The right lung was compressed and unaërated. The right pleural cavity was two-thirds full of turbid serum. The pulmonary and costal pleura were thickly coated with fibrine. The pulmonary pleura showed no other changes except some infiltration with fibrine and pus cells. The costal pleura was a little thickened. No tubercles were visible to the naked eye, but they were present in large numbers. Except for the compression of the right lung, there were no changes in the lungs. The heart, liver, and spleen appeared to be normal. In the kidneys the epithelium of the cortex tubes was somewhat swollen. The uterus was of ordinary size, its inner surface was congested and coated with mucus. No lesions of the Fallopian tubes or ovaries. The peritoneum was everywhere coated with a thick layer of fibrine and pus. It was somewhat infiltrated with cells, but contained no tubercle. There was a little fluid pus in the peritoneal cavity.

Case IV.—Male, æt. 48 ; seaman ; cooper. The patient gave no symptoms of syphilis, and says he has always been temperate. His general health was good until about eight years ago. At that time he suffered from rheumatism, and since then has had a number of attacks of that disease. Five years ago he was said to be suffering from chronic Bright's disease. For five weeks before his death he complained of severe dyspnœa, of cough, with mucous expectoration, and of a diminution in the quantity of urine passed. He was first seen two days before his death. At that time his general condition was still pretty good. The right pleural cavity was nearly full of fluid. He passed only seven ounces of urine during the next twenty-four hours, of specific gravity 1010, and containing a little albumen. He continued in the same condition until two hours before his death, when he complained of nausea, then vomited, his pulse became very feeble, then imperceptible, and he died quietly.

Autopsy twenty-four hours after death. Body well nourished ; no subcutaneous œdema. There were some old thickenings of the pia mater, and a considerable amount of clear serum in and beneath this membrane. The brain and its bloodvessels seemed to be normal. The right pleural cavity was full of clear serum. The costal and pulmonary pleura were thinly coated with fibrine, and there were thin adhesions of fibrine between the two pleural surfaces. The costal pleura was thickened ; no tubercles visible to the naked eye. The right lung was compressed against the vertebral column, and entirely unærated. The left lung was congested and œdematous. In both lungs the bronchi were congested and coated with mucus. The right cavities of the heart were distended with red and yellow clots ; the left cavities contained a little fluid blood. The aortic and mitral valves were thickened ; the left ventricle was dilated, and its walls somewhat thickened. The liver was large and fatty. The spleen was large. The mucous membrane of the pyloric end of the stomach was thickened and coated with mucus. The kidneys were well marked examples of the atrophic form of chronic Bright's disease.

Case V.—Male, æt. 51 ; New York ; photographer. Mother died of phthisis. Patient has been habitually intemperate. He has had a cough with mucous sputa, occasionally streaked with blood, for several years. For nine weeks before his death he did not feel well. For six weeks before his death the cough was worse, and the sputa more abundant. Three weeks before his death, after a debauch, he came home feeling chilly and with a pain in his left side. Since that time he has lost strength ; has been troubled with nausea and vomiting ; has had night sweats, but the cough has been better. Twelve days before his death he became delirious. Nine days before his death he came under observation. At that time he was quite fat ; somewhat jaundiced, complained of pain in the left axilla ; had a short cough, with scanty muco-purulent sputa ; pulse 132, respiration 24, temperature $98\frac{4}{5}$. The left pleural cavity was about half full of serum. His pulse continued to be rapid and feeble ; his respiration rapid ; his temperature was between 98 and 100. He passed into a typhoid condition, and died.

Autopsy sixteen hours after death.—Body fat and somewhat jaundiced. The brain and its membranes were normal ; the heart was normal, except for a slight thickening of the mitral valves.

In both lungs the bronchi were trabeculated, congested, and coated with muco-pus. In the right lung were a number of small, pea-sized lobules of red hepatization. These were composed of fibrine and pus within the air-vesicles and small bronchi. The left lung occupied the upper half of the pleural cavity. It was adherent to the chest-wall over its anterior and upper surface. The lower lobe of the lung was compressed; at the apex were a few miliary tubercles. The pulmonary, costal, and mediastinal pleura on the left side was thickly studded with white miliary tubercles. The costal and mediastinal pleura was thickened, and the whole pleura was covered with a thick layer of fibrine. The pleural cavity was two-thirds full of reddish serum.

The liver weighed 5½ lbs., and was cirrhotic and fatty. The spleen was a little enlarged and soft. The kidneys were normal. The mucous membrane of the stomach and small intestines was small, and coated with mucus.

In all these cases the lesions of the pleura were essentially the same. The principal difference being in the character of the inflammatory products which accompanied the tubercle.

In Case I. there was a large amount of bloody serum in the pleural cavity, and a moderate coating of fibrine on the surface of the pleura.

In Case V. bloody serum was present, but there was a very thick coating of fibrine on the surface of the pleura.

In Case III. turbid serum was present in large amount, and there was a good deal of fibrine.

In Case IV. the serum was clear, and the fibrine was scanty.

In Case II. the serum was purulent, and the fibrine was not abundant.

In all the cases the costal pleura was thickened, but in different degrees.

In all the cases the lesions were confined to one side of the pleura, and in all the cases, except one, the tubercle was confined to the costal pleura.

The tubercle was in the form of small, whitish nodules imbedded in the thickness of the pleura. In Cases I. and V. these nodules were large enough to be seen with the naked eye, in the other cases they were so small as to be detected only by the microscope.

The structure of the tubercles was the same in all the cases. The nodules were of irregularly globular form, composed of a delicate basement substance in which were imbedded polygonal nucleated cells, round cells, and giant cells. The giant cells were very large and irregular. Around the tubercles there was a development of small polygonal cells and round cells splitting up the fibres of connective tissue.

In all the cases, except Case II. and Case V., there were no tubercles in the lungs or in other parts of the body, the tuberculosis was strictly a local one. In Case II. the lungs presented the lesions of chronic phthisis, but the pleurisy was not of the character that is usually found as secondary to phthisis.

Case III. is of especial interest for the reason that the pleurisy was secondary to the peritonitis, and that it was of such short duration as to make it probable that the tubercle was developed at the commencement of the inflammatory processes.

The fact that in several of the cases the tubercles were not visible to the naked eye, and were only detected by minute examination, renders it probable that such cases occur more frequently than is generally supposed.

ARTICLE XI.

A CONTRIBUTION TO THE STUDY OF THE ACTION OF THE CARBOLIZED SPRAY IN THE ANTISEPTIC TREATMENT OF WOUNDS.[1] By B. A. WATSON, M.D., Surgeon to Jersey City Charity and St. Francis's Hospitals, Jersey City, N. J.

THE question—whether the carbolized spray is an essential part of the antiseptic wound treatment—has not until quite recently received much attention, and the conflicting opinions expressed on this subject by eminent surgeons render it particularly desirable that the results of observation and careful experimentation should be recorded. The further consideration of this topic becomes now especially important, since the profession have accorded to this treatment a very high rank; but the supposed difficulties attending its proper application by those unfamiliar with its details have caused many modifications to be offered even by those who are ignorant of the theory on which this system of treatment is based. These modifications, as might be anticipated, are generally of such a character as to destroy, or but imperfectly fulfil, the conditions required in antiseptic surgery. The successful practice of Lister's antiseptic system requires not only a knowledge of the principles on which it is based, but also faith in it. Dr. Just Lucas Championnière says on this subject, that the antiseptic method is founded on a certain number of theoretic bases, of which the first and most important is the idea of the existence of germs; therefore, for the accomplishment of the object, the surgeon ought to be perfectly convinced of the germ theory. He ought to see the germs in the atmosphere, graphically says the eminent professor of Edinburgh, as one sees the birds in the air. Dr. L. A. Stimson says:[2]—

> "The theory briefly stated is, 1st, that, if the surface and secretions of a wound are preserved uncontaminated by living putrefactive germs, the process of repair will be carried on under the most favourable conditions, and those redoubtable septicæmic complications which have been the scourge of hospital surgery will be entirely prevented; 2d, these putrefactive and other specifically poisonous germs come to the wound only from without, that is, by the medium of the air and of the hands and instruments of the surgeon. Therefore, treat-

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[1] I desire to acknowledge the valuable assistance which I have received in the preparation of this paper and the performance of the experiments related from Dr. John Van Vorst, Jr., and Mr. Geo. W. C. Phillips.

[2] Amer. Journ. Med. Sci., vol. lxxix., n. s., p. 83.

> ment of a wound on this theory must be so conducted that no living putrefactive germ shall come into contact with it or its secretions. The methods by which it is proposed to realize this condition are based upon the germicide quality of carbolic acid, upon the alleged fact that the vitality of germs is destroyed by contact with a solution of one part of carbolic acid in twenty of water. The air is sought to be purified during the operation, and the subsequent dressings, by filling it with a fine mist of the carbolic solution, and the dressings that envelop it are charged with carbolic acid. . . . Now, if the spray is essential to the method, the items of expense and personal discomfort are not sufficient to justify us in discarding it; and, if the apparatus is defective or its use unskilful, they must be improved. . . . It is, however, as a germicide, as a preventive of putrefaction by purifying the air, that it has been devised and its use recommended. It is as such that it has been offered, as such it has been accepted, and as such we have submitted more or less patiently to its discomforts. As such, therefore, it must be judged. Not a few surgeons have refused to use it, but they have justified their refusal, not by a denial of this quality in the spray, but by the adoption of measures for the destruction of the germs after their arrival upon the wounds."

The germ theory and its relation to the treatment of wounds have been clearly and fairly stated by Dr. Stimson, and it now remains to be determined whether the carbolized spray, as employed in the antiseptic treatment, supplies the demand of this theory by preventing living germs from coming in contact with the wound-surface or its secretion. The first question which presents itself in this connection for our consideration is, Does carbolic acid possess germicide properties? This question appears to have been settled beyond the possibility of a doubt by the recorded results of numerous experiments; and Prof. Alfred Stillé (*Therapeutics and Mat. Med.*, 4th ed., vol. i. p. 779) expresses on this subject the general opinion of the profession under the following subdivision:[3]—

> "*Action in Arresting Fermentation and Putrefaction.*—It is to this property that the utility of carbolic acid in medicine is chiefly due. A very small proportion of the acid added to a solution of sugar, with yeast, and placed under the most favourable conditions for fermentation, will completely prevent this process, or arrest it if it has already commenced. All forms of animal tissue are protected indefinitely from putrefaction by this acid, which arrests it also after it has begun."

The second question which relates to our subject is the proportionate quantity of acid required to prevent or arrest putrefaction in albuminous fluids. On this point the reports of different experimenters differ widely; while one informs us that one part of the acid to five hundred parts of the fluid containing the organisms is sufficient to destroy them, or, if introduced into it prior to their making their appearance, it will effectually prevent the same; but another reports that one part of the acid to one hundred parts of the contaminated fluid is required. The correct explanation of these differences will be found unquestionably to depend in a measure on the strength of the acid, as well as the density and other properties of the decomposing fluids. In order to examine these questions, I prepared on the 13th of April, 1880, a decoction of beef. The meat employed for this purpose was fresh and almost wholly composed of muscular tissue. When the boiling had been completed the decoction was placed in a tumbler, and the top was covered with ordinary window-glass which had been so cut as to answer this purpose. The next morning the cover-glass was removed, and the small portion of fat which was found to cover the surface of the decoction was removed, and the cover was replaced. This fluid became speedily turbid, but was not examined microscopically until the 21st of the same month, when it was found to be literally swarming with bacteria. We now prepared for use in the burette an aqueous solution from the carbolic acid crystals, manufactured by E. Schering, of Berlin. There was then placed in a certain number of test-tubes a measured one-half ounce of the decoction, and to each was carefully added the amount of acid specified in the following table, with the results there mentioned. In order that we may speak of these results in the relation of parts, we shall here assume that the decoction possesses the same specific gravity as water, which, although not strictly correct, is nevertheless sufficiently accurate for all practical purposes:—

TABLE I.

No.	Date of experiment.	Quantity of acid.	Quantity of decoction.	Parts acid.	Parts decoction.	Date of 1st microscopical examination.	Condition.	Date of 2d microscopical examination.	Condition.
1	April 21	$\frac{1}{8}$ grs.	$\frac{1}{2}$ oz.	1	1920	April 22	Living	May 22	Living
2	“	$\frac{1}{4}$ “	“	“	960	“	“	“	“
3	“	$\frac{3}{8}$ “	“	“	640	“	“	“	“
4	“	$\frac{1}{2}$ “	“	“	480	“	“	“	“ [1]
5	“	1 “	“	“	240	“	“	“	Dead
6	“	$1\frac{1}{2}$ “	“	“	160	“	“	“	“
7	“	2 “	“	“	120	“	Dead	“	“
8	“	$2\frac{1}{2}$ “	“	“	96	“	“	“	“
9	“	3 “	“	“	80	“	“	“	“
10	“	4 “	“	“	60	“	“	“	“

The turbid condition of the beef decoction which has been previously mentioned was observed to gradually disappear in every instance after the addition of the carbolic acid solution, provided the same had been added in a sufficient quantity to cause the death of the living organisms, although in the bottom of each of these tubes there remained a considerable deposit. This fluid, having become clear in these cases, remained so until the first day of July, when it was emptied out of the test-tubes. The fluid in the other test-tubes containing the living organisms were still, and had been continuously, muddy. We are now prepared by study and experimental research to express the opinion that carbolic acid is justly regarded as a germicide, and, furthermore, that its beneficial action in the treatment of wounds is due to this property and not to its topical action on the tissues. The latter opinion is strictly in harmony with our clinical observation.

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[1] There was found in this test-tube only living micrococci, while Nos. 1, 2, and 3 still contained besides these organisms also living streptococci, the same as found in the beef decoction prior to the addition of any acid.

TABLE II.—*Urine Experiments*.[1]

	No. experiment.	No. test-tubes.	Date.	Reaction.	Preparation.	Protection.							Results.				Remaining perfect.	Accidents.
						Hermetically sealed.	Open.	Exposed to spray.	Left open.[3]	Cotton plugged.	Gauze covered.	Listerized.	Number.	Date.	Appearance.	Microscopic examination.		
Dr. Stimson's test-tube experiments.	I.[2]	2	Feb. 5	Acid	Filtered hot	2	......	..	..	..	..	..	1	Feb. 13	Turbid	Bacteria	0[5]	
													1	" 20	Not turbid	No bacteria	0	Broken.
		2	" 5	Alkaline	" "	2	......	..	..	..	..	..	2	June 30	" "	" "	2	
	III.	4	" 14	Acid	Filtered cold	4	......	..	..	..	..	..	3	Feb. 29	Turbid	Bacteria	0	Cracked.
													1	June 30	Not turbid	No bacteria	1	
	IV.	3	" 18	"	" "	3	......	..	..	..	..	..	3	" 30	" "	" "	3	
	I.	3	" 5	"	Filtered hot	..	......	..	..	2	..	..	1	Feb. 16	Turbid	Bacteria	0	
										.	..	..	1	" 29	Scum[4]	"	0	
										.	1	..	1	" 29	"	"	0	
	I.	3	" 5	Alkaline	" "	..	......	..	..	2	..	..	2	June 30	Not turbid	No bacteria	2	
										.	1	..	1	March 5	Turbid	Bacteria	0	
	III.	6	" 14	Acid	Filtered cold	..	......	..	..	3	..	..	2	June 17	"	"	0	
													1	" 20	Not turbid	No bacteria	1	
											3	..	1	Feb. 18	Turbid	Bacteria	0	
													1	" 19	"	"	0	
													1	March 5	"	"	0	
	IV.	6	" 18	"	" "	..	......	..	..	3	..	..	3	Feb. 23	"	"	0	
											3	..	3	" 23	"	"	0	
	I.	3	" 5	Alkaline	Filtered hot	..	1½ hours	..	..	3	..	..	1	March 18	"	"	0	
													2	June 8	Scum	"	0	
	III.	3	" 14	Acid	Filtered cold	..	1¼ hours	..	..	3	..	..	1	Feb. 17	Turbid	"	0	
													2	" 19	"	"	0	
	IV.	3	" 18	"	" "	..	1½ hours	..	..	3	..	..	1	" 20	"	"	0	
													1	" 23	"	"	0	
													1	March 1	"	"	0	
	I.	2	" 5	"	Filtered hot	..	......	2	..	2	..	..	1	Feb. 16	"	"	0	
													1	June 30	Not turbid	No bacteria	1	
	I.	3	" 5	Alkaline	" "	..	......	3	..	3	..	..	3	" 30	" "	" "	3	
	III.	2	" 11	Acid	Filtered cold	..	......	2	..	2	..	..	2	Feb. 19	Turbid	Bacteria	0	
	IV.	3	" 18	"	" "	..	......	3	..	3	..	..	1	" 20	"	"	0	
													2	" 23	"	"	0	

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[1] In these experiments the urine varied in sp. gr. from 1010 to 1020; it was in all cases clear, boiled in Florence flasks, filtered, reboiled, and placed in water bath, except in the beaker experiments, which were not reboiled or placed in water bath.

[2] Urine from two persons—one acid, the other alkaline.

[3] The term "Left open" is applied to those tubes which were not closed during any portion of the experiment.

[4] The "scum" was generally of a dirty white or grayish color, and like turbidity, always in these experiments indicated putrefaction.

[5] The sealing of this tube was bunglingly done.

TABLE II.—*Continued.*

	No. experiment.	No. test-tubes.	Date.	Reaction.	Preparation.	Protection.							Results.				Remaining perfect.	Accidents.
						Hermetically sealed.	Open.	Exposed to spray.	Left open.	Cotton plugged.	Gauze covered.	Listerized.	Number.	Date.	Appearance.	Microscopic examination.		
Dr. Stimson's beaker exp'ts.	V.	6	Feb. 21	Acid	Not filtered	..	......	..	..	..	..	..	3[1]	Feb. 27	Scum	Bacteria	0	
								3	..	..	..	..	3	" 27	Turbid	"	0	
	IX.	1	April 10	"	" "	..	......	..	1	..	..	..	1	April 16	"	"	0	
		6	" 10	"	" "	..	......	..	..	..	..	..	3	" 27	"	"	0	
													1	" 27	"	"	0	
								3	..	..	..	..	1	May 5	Scum	"	0	
													1	June 18	Clear	No bacteria	1	
																	0	
Test-tube experiments.	VI.	3	Feb. 25	"	Filtered cold	..	3	..	..	..	..	..	3	Feb. 26	Turbid	Bacteria	0	
	XI.	3	April 13	"	" "	..	3	..	..	..	..	..	3	April 16	"	"	0	
	VI.	3	Feb. 25	"	" "	..	......	..	..	3	..	..	1	March 4	"	"	0	
													1	" 5	"	"	0	
													1	" 13	"	"	0	
	XI.	3	April 13	"	" "	..	......	..	..	3	..	..	1	May 27	Scum	"	0	
													2	June 30	No scum	No bacteria	2	
	VI.	14	Feb. 25	"	" "	..	......	14	..	5	..	..	3	" 17	Scum	Bacteria	0	
													2	" 30	No scum	No bacteria	2	
										.	5	..	1	March 3	Turbid	Bacteria	0	
													2	" 4	"	"	0	
													1	June 28	Scum	"	0	
													1	March 9	"	"	6	
										.	..	4	1	" 18	"	"	0	
													3	June 30	No scum	No bacteria	3	
	XI.	13	April 13	"	" '	..	......	13	..	5	..	..	4	April 22	Turbid	Bacteria	0	
													1	June 30	Not turbid	No bacteria	1	
										.	4	..	2	April 27	Turbid	Bacteria	0	
													1	" 22	"	"	0	
													1	May 3	"	"	0	
										.	..	4	1	April 22	"	"	0	
													2	" 27	"	"	0	
													1	May 17	"	"	0	
	XII.	15	May 3	"	" "	..	......	..	3	..	..	..	3	" 8	"	"	0	
							6	..	..	3	..	..	3	" 17	"	"	0	
							$1\frac{1}{2}$ hours	..	..	.	3	..	3	" 17	"	"	0	
								6	..	3	..	..	1	" 17	"	"	0	
													1	June 8	"	"	0	
													1	" 30	"	"	0	
											..	3	2	" 8	"	"	0	
													1	" 28	"	"	0	

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[1] Covered with inverted tumblers.

TABLE III.—*Beef Experiments.*

No. experiment.	Pieces.	Date.	Protection.						Results.				Remaining perfect.	Accidents.
			Hermetically sealed.	Open.	Exposed to spray.	Left open.	Cotton plugged.	Listerized.	Number.	Date.	Appearance.	Microscopic examination.		
VII.	21	Mar. 2	3	..	..	..	..	..	1	Mar. 8	Turbid	Bacteria	0	Broken.
									2	June 30	Not "	No "	2	
						3	..	..	3	Mar. 4	Turbid	Bacteria	0	
				3	..	..	3	..	3	" 5	Scum	"	0	
				1½ h.			3		2	" 4	Turbid	"	0	
								..	1	June 30	Not "	No "	1	
					6	2	..	..	2	" 30	" "	" "	2	
							2	..	2	" 30	" "	" "	2	
								2	2	" 30	" "	" "	2	
								3	2	" 5	Scum	Bacteria	0	
									1	" 30	No "	No "	1	
VIII.	26	Mar. 9	5	..	..	..	..	..	2	Mar. 13	Turbid	Bacteria	0	Cracked.
									3	June 30	Not "	No "	3	
						6	..	..	6	Mar. 11	Turbid	Bacteria	0	
							3	..	3	" 11	"	"	0	
			3	..	3	..	..	..	2	June 30	Not "	No "	2	
									1	" 30	Turbid	Bacteria	0	Cracked.
					9	..	6	..	1	May 22	"	"	0	
									1	" 31	"	"	0	
									1	April 3	"	"	0	
									2	May 18	"	"	0	
									1	June 30	Not "	No "	1	
								3	1	May 22	Turbid	Bacteria	0	
									2	June 30	Not "	No "	2	

The foregoing tables exhibit the results and other important data of a series of experiments made for the purpose of determining the value of the carbolic spray as an antiseptic agent.

The experiments in the above table are arranged with especial reference to their similarity. Test-tube experiments I., III., and IV. are a repetition of those performed by Dr. L. A. Stimson, and reported in *The Amer. Journ. Med. Sci.*, January, 1879. The same may be said of the beaker experiments. Test-tube experiments VI. and XI. were made for the purpose of studying the efficiency of the spray at various distances from the atomizer. The beef experiments, Table III., VII., VIII., and X. (the first two only appearing in the table) were performed for the purpose of enabling us to study the action of the spray on solid putrescible substances. The chief object of experiment No. XII. is to enable us to estimate the real value of the various protective measures, and for this purpose we compare the cotton-plugged and other tubes with those which were left continuously open. The urine employed in the second experiment was boiled in a copper retort, and traces of copper having been discovered subsequently, we therefore determined to omit all further consideration of it, and consequently it does not appear in the table. The table itself shows at a glance the general procedure in each experiment, with the results of the same; the grouping and its objects have already been explained, and we shall now proceed to describe all other important details connected with a single test-tube experiment; but since the manipulations in the other experiments of this class were essentially the same, there exists no necessity for a repetition.

The three-fourths ($\frac{3}{4}$) inch test-tubes employed in these experiments were new, and also purified in the flame of a Bunsen burner, after which they were immediately half filled[1] with boiling urine by an assistant, and then promptly placed in the water-bath or otherwise distributed in accordance with the programme. Hermetically sealing the tubes in the first experiment was found to be somewhat troublesome, and not performed in accordance with any particular rule, and consequently not perfectly satisfactory. The plan adopted in the subsequent experiments was as follows: The test-tubes were taken from the water-bath with forceps, which had been previously purified by heat, immediately conveyed to the flame of a Bunsen burner, in which the base of the tube was allowed to remain until the urine again boiled, when the mouths of the tubes were brought into such a position as to be perfectly covered by the flame, and while this relation of the tubes to the flame was maintained, the urine in the base of the tubes was cooled, so as to prevent the generation of steam; and now the sealing was easily and satisfactorily performed by merely directing a portion of the flame with the blow-pipe on that part of the tube which it was desired to close. Weir's steam atomizer was employed to generate the spray, and the solution used was that commonly designated as 1–30, which produces a spray of one part carbolic acid to forty parts of water. The tubes in each of these experiments were kept under the spray one hour and a half, and the average quantity of 1–30 solution used during this period was about thirty-eight ounces. The temperature of the room in which the tubes were kept during that period of time commencing on February 5th and ending July 1st, varied greatly. The lowest temperature was 65° F. and the highest 97° F. During the process of spraying in experiments I.,[2] III., and IV., the atomizer was at a distance of three and a half feet from the tubes and one foot above them, and during half the time the board was up behind the tubes to throw the spray back over them. When the tubes in experiment IV. had been under the spray forty-five minutes, dust was made to fall over them and mix with the spray. Some dust was made to enter a particular tube, which was afterwards carefully watched in order that its effects might be noted. In none of the other experiments was there any dust intentionally introduced into any of the tubes. In the other experiments the test-tubes were placed as follows:—

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[1] Experiments XI. and XII. are exceptions to this rule. In No. XI. the tubes were filled within ½ inch, and in No. XII. within ¼ inch of the top.

[2] Spray off a few seconds during the process of spraying.

In No.	VI.	3	test-tubes	3½	feet	from atomizer.
"	"	3	"	3	"	"
"	"	3	"	2½	"	"
"	"	3	"	2	"	"
"	"	2	"	1½	"	"
"	[1]XI.	3	"	3½	"	"
"	"	3	"	3	"	"
"	"	3	"	2½	"	"
"	"	3	"	2	"	"
"	"	1	"	1½	"	"
"	XII.	3	"	3½	"	"
"	"	3	"	3	"	"

The lateral spaces intervening between these tubes were one inch and the atomizer was one foot[2] above them. The same care was exercised in regard to cleanliness of hands and instruments which is required by the strictest adherents to the Lister system in the performance of a surgical operation on a living subject. The removal of the test-tubes from the water-bath, in which they were kept forty-five minutes, was accomplished by bringing the bath under the spray while it was still boiling. The same care was exercised in covering or plugging the tubes. The cotton employed for the purpose was either soaked in alcohol or a 1–20 solution of carbolic acid until every fibre was thoroughly saturated. Common twine was employed in the first three or four experiments to retain the cotton and other covers in place, but Faber's rubber bands were afterwards substituted for them and found to be much more convenient and equally serviceable. The same pipette was employed in all microscopical examinations prior to March 31st, and the instrument was carefully cleansed as often as deemed necessary, in order to secure reliable results; but on and after the above date a new instrument was used in each fluid examined. Only one other fact remains to be mentioned in connection with our manipulations in these experiments. The water-bath which we employed was so constructed as to cover only about four inches of the lower portion of the tubes in the boiling water, and consequently in the experiments Nos. XI. and XII. the urine in the upper portion of the tubes was not maintained at a temperature of 212° F. while in the bath.

Having sketched the important details pertaining to the performance of these experiments, we now proceed to examine some of the results. Attention has already been called to the fact that in the fourth experiment, when the tubes had been under the spray forty-five minutes, dust was made to fall over them and mix with the spray; and now, by a reference to Table No. II., we find that there were in this instance three tubes thus exposed, and that putrefaction in one tube occurred after the lapse of two days, and in the other two at the expiration of five days. The tube which the dust was seen to enter—which rested a few seconds on the surface of the urine, but finally settled down into it—was the first in which putrefaction occurred. It will also be observed that putrefaction occurred in the two tubes of the third experiment, which were exposed to the spray, after the lapse of five days. In the latter case there is no explanation which I can give, although the third contrasts so strangely with the results in the first experiment. In the first experiment five tubes were placed under the spray, two containing acid and three alkaline urine. The acid urine in one tube was found to be putrefactive after the lapse of eleven days, while the other tube containing acid urine, and the tubes containing the alkaline urine were found unchanged after the lapse of 146 days. An examination of this table shows throughout that putrefaction was much slower to take place in the alkaline urine than in the other specimens which were acid. We also find in our repetition of Dr. Stimson's test-tube experiments, that on the 30th of June there still remained unputrefied the contents of seven tubes besides those which were hermetically sealed. Three of these tubes in which the contents were unchanged had been plugged with cotton while in the water-bath, and the other four had been first exposed to the spray and then plugged with the same material as the former. It should now be understood, that in our calculation of the average lapse of time prior to the beginning of putrefaction, that in these cases we calculate from the date of the experiment to the first day of July. This calculation, although not accurate, is nevertheless sufficiently so for practical purposes. In all the other cases we calculate from the date on which the experiment was made to the day on which the first indication of putrefaction was observed. We now find that the average lapse of time expressed in days prior to the commencement of putrefaction is as follows: Cotton-plugged, $72\frac{4}{10}$; under the spray and then cotton-plugged, $61\frac{7}{10}$; under the spray the same length of time, and then covered with gauze, $12\frac{1}{8}$; open an hour and a half and then cotton-plugged, $35\frac{4}{9}$. A comparison of the tubes which were merely cotton-plugged with those which were exposed to the spray and then cotton-plugged, indicates that putrefaction is hastened by this exposure. A comparison of the tubes under the spray one hour and a half with those which were left open during the same length of time indicates here the relative value of the spray as a preventive of putrefaction. The rapidity with which putrefaction occurred in the gauze-covered tubes may probably be attributed to the fact that it offers but a slight barrier to the ingress of germs. We will now examine the results of our repetition of Dr. Stimson's beaker experiments, which will be found in this table numbered V. and IX.; and as it is desirable to be as brief as possible, I shall merely state here, that the beaker glasses which we employed were new, and their dimensions and our manipulation corresponded in every respect with those which Dr. Stimson has so minutely described in his article, with the exception of a possible difference in the size of the inverted glass tumblers which we employed as covers. The tumblers which we used rested on the top of the beakers and reached within an eighth of an inch of the surface on which the beakers were placed.

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[1] Spray began to give out while applying the gauze and Lister coverings, owing to the exhaustion of the water in the boiler.

[2] Experiments VI. and XI., the atomizer was only seven inches above the tubes.

Dr. Stimson says of his beaker experiments:[1] "In two days the three that had been exposed under the spray had become turbid, and at the end of a week the other three, those of the controlling experiment, were still bright. On examination the turbid ones were found to be strongly ammoniacal and swarming with cocco-bacteria of the double, chain, spiral, and rod forms." The results obtained by us in our repetition of the experiment differ widely from the above. In the fifth experiment the urine in the beakers under the spray, and that in those of the controlling experiment, each became putrescent on the sixth day. It, therefore, appears just to conclude that the exposure of the urine under the spray did not here hasten putrefaction. In experiment IX. the results are still more marked, and the experiment differs only by employing seven beakers instead of six; the supernumerary beaker being left open to determine the time required for putrefaction without the protection of covers. Putrefaction of the urine in this experiment occurred as follows: In the open beaker, after the lapse of six days; in the controlling beakers, and one of those exposed to the spray after seventeen days; in the second beaker exposed to the spray after the twenty-fifth day: whilst in the third beaker thus exposed it was found still perfect on the sixty-ninth day. It is a fact deemed worthy of mention in this connection, that in both our beaker experiments the beakers remained under the spray exactly forty-five minutes, but the quantity of $\frac{1}{30}$ solution used in the experiment V. was fourteen ounces, and that consumed in the experiment IX. was twenty-one ounces. Unquestionably the process of spraying in experiment IX. acted as a preventive of putrefaction, but its mode of action will be considered in another portion of this article.

We will briefly examine a few of the essential points connected with the experiments VI. and XI. In experiment VI. putrefaction had occurred in the urine contained in the tubes which had been left open at the end of the first day, and in experiment XI. the same change was delayed three days. In experiment VI. there were fourteen test-tubes exposed to the spray; five of these were afterwards cotton-plugged; five gauze-covered, and the other four were covered with gauze and Mackintosh. This covering being the same as that employed by Lister as a wound dressing, excepting the "lost gauze and protective," we have designated in the table "Listerized." The occurrence of putrefaction in this experiment averages when expressed in days as follows: Cotton-plugged, $118\frac{1}{5}$; gauze-covered, 32, and the Listerized, 100. In the experiment XI. thirteen test-tubes exposed to the spray, and these were afterwards covered as follows: Cotton-plugged, 5; gauze-covered, 4; and Listerized, 4. The occurrence of putrefaction expressed in days averages as follows: Cotton-plugged, $22\frac{4}{5}$; gauze-covered, $14\frac{3}{4}$; Listerized, $22\frac{3}{4}$. During both experiments—VI. and XI.—a board was placed behind the tubes to throw the spray back over them, and the tops of the test-tubes were only seven inches below the delivery tube of the atomizer. The most favourable average results were obtained from the spray as a preventive of putrefaction in those test-tubes which were placed at the distance of thirty inches from the atomizer, and those situated only eighteen inches from it, gave results nearly twice as favourable as those distant forty-two inches, while about the same rates prevailed in favour of those situated twenty-four inches from it, when contrasted with those thirty-six inches distant.

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[1] Loc. cit., p. 88.

The true explanation of this observation probably may be found in the divergence of the particles of spray immediately after leaving the delivery-tube of the atomizer. This action gives to the body of the spray a cone-shaped appearance; the apex being found at the mouth of the delivery tube, and the base some six or seven feet away. It now being admitted that the destruction of the germs requires that they should be wet with the spray, then it is no longer difficult to comprehend why the spray which is efficacious in preventing putrefaction thirty inches distant from the delivery tube may fail when the same material is placed forty-two inches away. We will proceed with a brief examination of the beef experiments numbered on the tables VII. and VIII. In these experiments the material employed was fresh beef taken from the round, which was carefully freed from fat, and then cut into pieces of the following sizes: in the former experiment the pieces were one-half inch cubes, and in the latter they were three-fourths of an inch in length by one-fourth of an inch in width, and of the same thickness. The requisite number of tubes were now half filled with boiling water, after which they were placed in a water-bath where the temperature was maintained at 212° F.; into each of these tubes a single piece of meat was introduced after having been boiled about thirty minutes. Each piece of meat before it was boiled, which was intended to be placed under the spray, was fastened to the end of a wire six or seven inches long, such as is commonly used by florists. The pieces of meat were then suspended by these wires on another wire stretched in the axis of the spray from the delivery tube to the foot-board. The meat having been kept under the spray one hour and a half was now dropped into the tubes containing water, which had been previously boiled and afterwards cooled under the spray, by merely cutting the suspensory wires.

It is thought that the other details in the performance of these experiments, as well as the results of the same are sufficiently set forth in the table. It may be added here that the general observations previously recorded of other experiments which have been examined are also confirmed by these; but in addition to these is the fact shown in the experiment VII.

that a small piece of meat having been exposed to the spray may then remain one hundred and one days without undergoing putrefactive changes, although kept in water, and freely exposed to the air, and in a temperature varying from 70° F. to 97° F. What is the explanation of this phenomenon? May it not possibly be found in the fact, that this piece of meat being placed near the delivery tube had soaked up during the process of spraying a sufficient quantity of the carbolic acid solution, with that adherent to its surface at the time it was dropped into the half-filled tube, to act in this quantity of water as a complete preventive of putrefaction? The further consideration of the action of the spray on solid bodies in preventing putrefaction will be postponed until we bring forward experiment number X., which was not placed on the table, since there was none similar to it, and consequently our work could not be lessened by any tabular arrangement.

The experiment XII. is confirmatory of all the others in all essential points. We discover by an examination of the tubes in this experiment that the urine in the tubes which were left open was turbid, and contained bacteria after the lapse of five days. The urine in the tubes which were taken from the water-bath, and then left open one hour and a half, whether cotton-plugged or gauze-covered, after the expiration of fourteen days were found to be turbid, and to contain living organisms. The average lapse of time expressed in days prior to the commencement of putrefaction of the urine contained in the six tubes exposed to the spray, and then covered, is as follows: Cotton-plugged, 36; Listerized, 42$\frac{2}{3}$. Here it ought to be observed that the urine in those tubes which were exposed to the spray one hour and a half, and then cotton-plugged, held out against putrefaction just twenty-two days longer than that which had been left open ninety minutes, and then plugged in precisely the same manner as the others. It, therefore, seems natural to conclude that the use of the spray delayed in this case putrefaction. Having examined the various experiments mentioned in our table we will now briefly describe experiment X.

The material employed in this experiment was fresh beef taken from the round, which, after the removal of the fat with the knife, was cut into six pieces, three and a half inches in length, two inches in breadth, and about the same thickness. The pieces were then boiled one hour, after which they were treated as follows: One piece, suspended by a wire, remained in this manner freely exposed to the air; two pieces were wrapped in fresh cotton, in imitation of Guérin's cotton-wadding dressing, and this covering was held firmly in place by rubber bands; and the remaining three pieces were exposed to the spray forty-five minutes, and then carefully wrapped in the Lister dressing, excepting the protective and lost gauze, these wrappings being retained in place by the firm application of wire, which was employed as a substitute for twine. The piece exposed freely to the air was observed to emit a very slight putrefactive odour on the 17th day of the experiment, although the meat was then dry. The two pieces wrapped in cotton were found perfectly dry and untainted on the 29th day.

The experiment was performed on the 10th day of April, but that portion of it which was exposed to the spray was first examined May 2d, under the spray, and the following conditions noted: The first piece examined was found to be moist and perfect, without the slightest indication of putrefaction, and was consequently replaced in the dressing. The other two pieces were inspected at the same time, and found to be moist and sweet, although there was found in each a patch of mould about as large as a silver twenty-five cent piece, which it resembled in shape. This mould was supposed to indicate the initial stage of putrefaction, and consequently the pieces were thrown away. The first piece examined, and the only one returned to its dressing, was re-examined June 30th, and as its condition was now the same as that of the others at the first inspection, this piece was disposed of in the same manner as they had been. The results of this experiment cannot be compared with each other, since the surrounding conditions were so entirely different. The piece of meat suspended by the wire, as well as those pieces enveloped in the cotton, were unquestionably protected against putrefaction by the loss of their moisture, but this was not the case with those which were exposed to the spray. The latter being enveloped in the Lister dressing, including the Mackintosh, did not lose their moisture. An examination made on the 22d day after the exposure to the spray proved that one of the pieces was absolutely free from any indication of putrefaction, and it was not until after the 81st day that even a small patch of mould was found on it.

The situation of the mould in these pieces of meat maintained the same relation to the wrappings. In each case the locality of the mould was exactly opposite to the lateral fold in the dressing. Is it not, therefore, probable that, notwithstanding the care which was taken to avoid the same, that the germs giving rise to this deposit gained their entrance through this fold?

The next question which arises in connection with the consideration of this subject is, Why was putrefaction delayed so long in the presence of a highly favourable degree of heat and moisture if there were living germs continuously in contact with this putrescible substance? While it may not be possible to settle these questions beyond the possibility of doubt, nevertheless it must be admitted that the facts are in favour of the entrance of the germs from without rather than remaining continuously within the dressing.

Having completed the individual or classified analysis of all the experiments, we will now give a *résumé* of the six test-tube trials, in order to bring out as clearly as possible the average results and the lessons taugh by the same. It will readily be perceived that the most important comparison is between the tubes which remained open one hour and a half and those exposed to the spray for the same time. This comparison makes apparent the value of the spray as a preventive of putrefaction. The following are the important average results of the test-tube experiments: 12 tubes open one hour and a half, and then plugged with cotton, were found to have undergone putrefaction after the lapse of $31\frac{1}{6}$ days; while in the 20 tubes exposed to the spray, and then cotton plugged, the same condition was only reached after the lapse of $66\frac{1}{2}$ days. It therefore appears that putrefaction was delayed $35\frac{1}{3}$ days by the use of the spray. The results are even more favourable than appears from this calculation, since there remained on the 30th day of June seven tubes which had been under the spray, but none of the others, in which putrefaction had not yet occurred. We find that putrefaction occurred in the 16 tubes which were plugged with cotton in the water-bath after the lapse of $60\frac{1}{16}$ days, and that five remained unchanged on June 30th. The results are also in favour of the spray.

Further examination of the average results may be interesting as exhibiting the comparative value of the different protective coverings, and we, therefore, give the time which had elapsed in each case prior to the occurrence of putrefaction. In the 11 tubes exposed to the spray and then Listerized the time was $54\frac{5}{11}$ days, and there remained "perfect" June 30th the contents of three test-tubes. In the 9 tubes exposed to the spray and then gauze-covered the time was $24\frac{1}{9}$ days, while in the 8 tubes which were gauze-covered in the water-bath without being exposed to the spray the time was only $12\frac{1}{8}$ days. It appears from the results of the gauze-covered tubes that the spray acted as a preventive of putrefaction even here; and, *since these results are strictly in harmony with those observed throughout this series of experiments, we therefore conclude that the carbolic spray is advantageous as employed in the practice of antiseptic surgery.* The next important question for our consideration is, How does the spray act? The power of carbolic acid as a germicide has already been demonstrated to the entire satisfaction of the medical profession, and none deny that it is very destructive to the lower forms of life—bacteria, vibriones, fungi, etc.

Furthermore, as putrefaction and fermentation are dependent on the growth and multiplication of these minute bodies, carbolic acid, by destroying their activity, arrests zymosis. The power and action of carbolic acid being admitted, it now follows that the spray, in order to be efficacious, must possess a certain strength and density. The strength of the spray must be such as to destroy the vitality of the germs, and its density so great as to effectually moisten them. The results obtained by our experiments render it very probable that the most of the germs while floating in the air were effectually moistened by the spray—although we recognize the fact that it is barely possible that these results may be possibly attributed to the accumulation of carbolic acid within the vessels containing the urine. The accumulation of the acid within the test-tubes must necessarily be very small, inasmuch as the mouths of these tubes were only three-fourths of an inch in diameter, and consequently it is improbable that the quantity of acid gathered from the spray and disseminated throughout the urine in these tubes should even possess the power of materially delaying the process of putrefaction. It may, therefore, be safely claimed that the spray *does purify the air*, and, furthermore, that the degree of purification must necessarily depend on the strength and density of the same.

It does not, however, follow that the beneficial action of the spray in the practice of antiseptic surgery is limited to the purification of the atmosphere, or, that its results can be equally well secured by some other method of procedure. I am fully satisfied that its beneficial action extends much further than this—although entirely due to its germicidal properties.

The conditions arising in amputation-wounds, which will especially attract the attention of the careful observer in those cases where Lister's system of wound-treatment has been strictly adhered to, are the complete absence of all putrefactive odours, the complete, or nearly complete, absence of pus; and then follows the absence of all those symptoms arising from septic infection. It is the degree of antisepsis which may be obtained by the use of carbolic acid in any method of wound-treatment which indicates the true value of the remedy, as well as that of the method of procedure; although practically it is quite immaterial to both surgeon and patient whether this result arises from destruction of the germs and organisms, or extends to their exclusion from the wound.

Having already experimentally shown that putrefaction in putrescible substances may be greatly delayed by the use of the spray, let us now consider its action especially in the practice of surgery. I must here call attention to the fact that the spray, when thrown on any solid substance, deposits within a few minutes a continuous layer of carbolic acid solution. It will now be readily seen that the spray having been properly directed on the parts where an incision is to be made, it now becomes impossible for any germs to reach the wound without having first passed through the wet line, and since this line is continuous no germ can pass or even remain in it many seconds without being thoroughly saturated with the solution.

The objection may possibly be raised that the moment an incision is made this solution will become so much diluted with blood as to be no longer efficacious for the destruction of germs and living organisms. I admit the force of this argument, and desire to add here that while the outward flow continues there is very little, if any, possibility of the patient being injured by germs or even living organisms, since those which happen to fall into the blood will be immediately floated away. Furthermore, the spray being kept constantly playing on the wound becomes again efficacious for its protection the moment there is a cessation in the flow of the blood. This wet line undoubtedly gives, independently of the purification of the air by the spray, an additional and important degree of protection, and here we observe the fact that all experimentation with the spray on putrescible fluids must fail to give similar results to those which we obtain in our practice of antiseptic surgery. The wet-line protection must be given a still wider scope. It must be even extended to the instruments employed by the surgeon, his hands, and likewise his clothing, as well as to all other surrounding objects in which the germs find a temporary lodgment, but from which they are liable to be transferred to the wound.

The highly satisfactory and almost perfect results obtained by the strict adherents to Lister's system of wound-treatment justifies the conclusion that the spray and other protective measures practised by this distinguished surgeon are a complete prophylaxis of putrefaction where properly employed; and the results of our experiments are confirmatory of this opinion. Furthermore, we are convinced that the use of the spray is an essential part of this system, and that no substitute has yet been offered which gives the same degree of protection.

Article XII.

On the State of the Blood in the Vessels of an Inflamed Part.

By Thomas Wharton Jones, F.R.S., F.R.C.S., Professor of Ophthalmic Medicine and Surgery in University College, London; Ophthalmic Surgeon to the Hospital, etc.

The redness of blushing, with accompanying heat (see the second part of my Discourse on the circulation of the blood in its bearings on Practical Medicine and Surgery, in the *Lancet*, vol. ii., for 1879), is owing to an increased afflux of blood to the face permitted by sudden dilatation of the small arteries. The paleness, with coldness, on the contrary, which may immediately precede blushing with heat, is owing to diminished access of blood to the face occasioned by constriction of the same vessels. This constriction of small arteries is owing to contraction of their muscular walls excited by some transient general nervous impression or emotion operating through the vaso-motor nerves. The action of the vaso-motor nerves now remitting, the contraction of the arterial walls gives place to relaxation, so that dilatation succeeds constriction of calibre, and the increased afflux of blood is thereby permitted.

The general nervous impression or emotion having exhausted its influence on the vaso-motor nerves of the part, the small arteries resume their ordinary width, and so, the circulation proceeding as before, the face regains its natural hue and temperature.

Phenomena similar to those of blushing may be observed very distinctly in the ear of the white rabbit. From being blanched and cold, the ear becomes red and warm again, at intervals of from a quarter to half a minute. Watching, we can see that the paleness and coldness of the ear are coincident with arrestment of the access of the blood in consequence of constriction of the large artery, whilst the succeeding redness and heat are owing to the free afflux of blood permitted by the dilatation of the artery which supervenes.

The flow of blood, it is to be particularly remarked, is not arrested merely by the constriction of the artery, *but the stream is actually pressed backwards;* the constriction of the artery being regressive *from branches to trunk*, and not contrariwise, as has been erroneously supposed. This may be observed in the frog's web or bat's wing, under the microscope, in a similar crisis of the circulation in those animals.

The redness of inflammation, at the same time that it is not transient like the redness of blushing, is more intense and the state of the blood in the vessels of the inflamed part is different.

In investigating the state of the blood in the vessels of an inflamed part, we have to depend on observations made on the web of the bat's wing or frog's foot, disposed under the microscope.

It is to be premised that, in a small drop of bat's blood drawn from the living animal and forthwith examined under the microscope, the corpuscles are seen to be similar to those of human blood, only somewhat smaller. The red corpuscles agglomerate together into rouleaux in the same manner.

The bat is the only mammiferous animal in which we can watch *satisfactorily*, under the microscope, the state of the blood circulating in the vessels, *not only for a length of time*, but also *time after time*. And what we thus see we may take as indicative of the state of the blood in the minute vessels of man. The state of the blood in the vessels of an *inflamed part of the bat's wing* we may in like manner accept as indicating in all essential particulars the state of the blood in the vessels of an *inflamed part of the human body*. Furthermore, as the state of the blood in the vessels of an inflamed web of the frog, observed under the microscope, is similar to that of the blood in the vessels of an inflamed part of the bat's wing, we may also accept observations made on the frog's web as sufficiently indicative of the state of the blood in the vessels of an inflamed part in man.

The state of the blood in the vessels of an inflamed part, I have said, is different from what it is in blushing. The greater intensity of the external redness is owing to injection of the vessels with *red corpuscles aggregated together to the exclusion of plasma* from among them. This we can see directly, under the microscope, both in the bat and in the frog; and there can be no doubt that what we can see with the help of a magnifying glass in the inflamed conjunctiva of man is indicative of a similar injection of the vessels with red corpuscles to the exclusion of plasma.

I have said that in blushing the arteries are dilated, and that the flow of blood not only in them but also in the capillaries and venous radicles is fuller and freer, so that the redness is owing simply to the greater quantity of blood, *comprising both corpuscles and plasma*, passing through the vessels. That the red blush of the skin is produced by a fuller and freer flow of blood comprising both corpuscles and plasma in the normal porportion may be demonstrated by the experiment of dividing the ischiatic nerve in a frog. The effect visible to the naked eye is that the skin of the leg operated on becomes redder than it was before, and redder than the opposite sound leg. This increased redness we find by microscopical examination to be owing to a fuller and freer flow of blood in the vessels in consequence of dilatation of the arteries from relaxation of their walls induced by the section of the vaso-motor nervous fibrils included in the division of the ischiatic.

It will be seen that in this experiment on the frog we have a microscopical exhibition of the actual state of the blood and the bloodvessels, whereas, in the analogous experiment of cutting the sympathetic nerve in the neck of a rabbit, we obtain only the general manifestation, to the naked eye, of continued vascular fulness in the ear. This vascular fulness is commonly put down as a manifestation of paralytic relaxation of the walls of capillaries and veins, as well as of arteries; but in the experiment on the frog we can see that it is the artery alone which has been affected by the section. Its walls being relaxed, its calibre has become dilated, and the capillaries and veins distended in consequence of the freer afflux of blood to them.

To return to the state of the blood in the vessels of an inflamed part. In an inflamed part of the web of the bat's wing or frog's foot, viewed under the microscope, we see that the red corpuscles are aggregated so closely together as to form a viscid tenacious-looking mass, which flows sluggishly or is actually stagnant within the vessels, injecting them as with a red injection.

The conditions under which the aggregation of red corpuscles takes place within the vessels will be explained below, but here it may be mentioned that the mode in which the corpuscles are seen, under the microscope, to aggregate is similar to that already described in the case of a drop of blood drawn from the body, and especially a drop of blood drawn from a person labouring under some acute inflammation with fever in which there is an increase of the fibrinous constituent of the plasma. In the vessels in which the blood may be still flowing, though sluggishly, the colourless corpuscles are seen accumulated in quantity on the inside of the walls of the vessels; but, in those in which the flow of blood is actually arrested, the colourless corpuscles are mixed up in the agglomerated and stagnant mass of red corpuscles.

In traumatic inflammation, as may be seen in the web of the bat's wing or frog's foot, vascular injection of the part is, in the first instance, produced by regurgitation of blood into venous radicles, capillaries, and extreme arterial ramifications to which the arteries implicated in the wound directly led,[1] but into which, of course, they no longer transmit blood. The regurgitation by which the venous radicles, capillaries, and extreme arterial ramifications are filled with blood takes place from such adjacent anastomosing vessels as receive their supply from unimplicated arterial branches which have their origin above the wound, and in which the blood is still flowing freely as yet.

The red corpuscles of the blood which thus become accumulated in the vessels of the wounded part aggregate together to the exclusion of the plasma; and it is in this manner that the congestion and stagnation of red corpuscles in the vessels[2] are brought about which occasion the redness by which the inflammation arising from the injury is first manifested.

Subsequently the vascular injection becomes increased and extended by accumulation and retention of more corpuscles received from the stream of blood in the uninjured arteries leading to the region of the wound. A more rapid supervention of this result may be demonstrated in the frog by cutting the ischiatic nerve. Owing to the dilatation of the arteries of the web generally thereby induced, and the consequent freer flow of blood in them, corpuscles in greater quantity make their way into the vessels in the region of the wound and there agglomerate.

A still greater increase and extension of the vascular injection in such a case may be demonstrated in another way, viz., by applying a solution of salt to the wounded web. Though this causes increased injection of all the vessels, we observe by careful watching under the microscope that the injection is greatest in the vessels of the injured part, because the blood forced into them by regurgitation is there retained, and stasis of the aggregated red corpuscles occurs more quickly.

In my essay on the state of the blood and the bloodvessels in inflammation, I relate at page 20, that in the frog's web, the arteries were sometimes found much constricted, in which case I observed that the direct flow of blood to their ultimate ramifications and to the capillaries was arrested, and that as long as this constriction persisted blood was seen to regurgitate from the neighbouring anastomosing and still open arteries, and from veins through the capillaries into the terminal ramifications of the constricted arteries. I also observed that the red corpuscles of the regurgitating and slowly moving blood became aggregated together, and that in some places stasis of the aggregated corpuscles took place. Such is the state of the blood in the vessels of a part at the very commencement of an inflammation excited by cold, for example. That the vascular injection is owing to the constriction of the arteries arresting the direct flow of blood is demonstrated by the dispersion of the accumulated corpuscles which take place if the arteries become dilated so that a full and free stream of blood in them is permitted. If such dilatation of the arteries does not spontaneously occur, we can bring it about by applying to the affected web a drop of some irritating fluid, such as spirit of wine. The first effect of this application is increased constriction of the arteries, but the constriction is soon superseded by full dilatation, whereupon a rapid stream of blood in them ensues, so that the accumulated corpuscles in the extreme arterial ramifications, capillaries, and venous radicles are driven onwards. Dilatation of the arteries, with acceleration of the flow of blood in them, and consequent similar dispersion of the congestion, I have found to be an effect of section of the ischiatic nerve.

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[1] See figure of this in Plate VIII. of my Essay in "Guy's Hospital Reports" for October, 1850. I have before me an original drawing of the same thing in the bat.

[2] I have before me a drawing representing this in a vein of the bat's wing which I made from the life.

In reference to all this, however, it is to be remembered that as above pointed out, *vascular injection brought on by a wound implicating arteries*, so far from being dispersed, is increased by such treatment, because the flow of blood in the divided arteries cannot, of course, be restored in the same manner.

A conjunctivitis in the human eye may, at the commencement, present itself as a small spot of vascular injection. On examining such a spot with a magnifying glass, we observe that the arteries are constricted, and that it is their extreme ramifications, the capillaries, and venous radicles, which appear to be injected to distension with red blood.

I have before said that vascular injection of the inflamed conjunctiva in man, as observed by the help of a magnifying glass, resembles the vascular injection in inflammation of the web of the bat's wing or frog's foot, as observed by the same means. For this reason, and knowing that the red corpuscles of human blood out of the body aggregate together like those of the bat's blood, and much more closely than those of frog's blood, we may fairly conclude that in the injected vessels of an inflamed conjunctiva, the corpuscles of the blood are accumulated and aggregated together in a manner similar to that in which we can directly see them in the vessels of the web of the bat or frog under the microscope.

In explanation of the *commencement of a catarrhal inflammation* of the conjunctiva, it is to be remembered that cold excites the vital contraction of the walls of the small arteries of a part with consequent constriction of their calibre. Now we have seen in the web of a frog under the microscope that when some of the arteries were persistently constricted, there took place from adjacent vessels in which the circulation was still free, regurgitation of blood loaded with red corpuscles into those venous radicles and capillaries to which the constricted arteries led, and thence in a retrograde course into the extreme ramifications of those constricted arteries themselves. We have also seen that the flow of this regurgitating blood, loaded with red corpuscles, was sluggish, and that here and there stasis of it within the vessels presented itself.

Such a state of blood, and bloodvessels as that here described, is the *only possible condition which can be conceived* as the first step to inflammatory congestion of the conjunctiva or other part in man from the impression of cold.

The first step to the vascular injection of the conjunctiva, caused by the irritation of a foreign particle in the eye, is in like manner constriction of the small arteries in consequence of the contraction of their muscular walls, excited by the impression made on the vaso-motor nerves either directly or by reflex action. And so again, also, the first step to the inflammatory congestion of a part of the human body—the bronchi for example—caused by the general impression of cold on the whole system is constriction of the small arteries excited by reflex action from the skin to the nervous centre, and thence to the nerves of the arterial walls.

The arteries leading to an inflamed part are, or become, much relaxed and dilated. In consequence of this, the supervening acceleration of the flow of blood in them may, as we have seen, disperse the congestion and stagnation in the extreme arterial ramifications, capillaries, and venous radicles, in which case resolution of the inflammation ensues. But should resolution fail to be accomplished, the dilatation of the arteries only leads to extension of the inflammation by allowing a greater quantity of blood to be poured into the vessels of the affected part than can escape in consequence of the pre-existing and persistent obstruction from stasis. An analogous phenomenon can, as already mentioned, be directly observed in inflammation of the frog's web from a wound.

The phenomena of inflammation affecting some external part of the body, which, from its size, may be conveniently made the subject of observation, have been correctly adduced as indicating that an increased quantity of blood enters the inflamed part, and circulates through it. The phenomena referred to, however, do not warrant the inference that there cannot be stasis of blood in vessels of the affected part. The part which is the actual focus of the inflammatory process is to be distinguished from the surrounding part, as for example, the deep red spot of vascular injection in pustular ophthalmia, surrounded by a blush arising from the free circulation in the neighbouring dilated vessels. It is into and within the latter that a greater quantity of blood circulates, and this because the arteries leading to and distributed in them are, as before mentioned, relaxed and dilated.

In frogs' webs, inflamed from the action of a strong solution of salt in such a degree that a part had sloughed, I sometimes found walls of veins gone. On the sides of such venous channels, destitute of walls, numerous colourless corpuscles were seen accumulated, whilst the blood was flowing freely in the middle. In a case in which the second web had sloughed away to a small piece, stagnation of blood still existed at the edge of that piece; but higher up a free flow of blood had now superseded stagnation in the vessels. Here walls of many of the vessels could no longer be distinguished to exist, and the blood appeared to be flowing in mere passages hollowed out in the substance of the web. All along the sides of the passages numerous blood corpuscles were collected; many of them red corpuscles which had become pale, distended, and of a round shape. In the portion of the web under notice, spots of extravasated blood were seen here and there.

While inflammatory congestion is taking place, and also when stasis has become established, the blood undergoes various alterations. At the very commencement we have seen how the accumulation and aggregation of the red corpuscles, to the exclusion of the plasma, constitutes an important step in the process on which the congestion depends. Then, again, as to the disposal of the excluded plasma: with the establishment of the inflammatory congestion, exudation of certain of the constituents of the plasma takes place through the walls of the vessels. Thus in the early stage, water with salts in solution, is transuded, and in consequence of the inspissation of the plasma thereby induced, the red corpuscles of the blood become more closely aggregated, and the congestion with stasis more fully established. This is illustrated by the exosmotic abstraction of water from the blood caused by the application of salt to the frog's web for the purpose of exciting inflammation; an application which I have also employed for the purpose of making preparations of the frog's web, in different stages of inflammation, by injecting the vessels with their own blood; for this latter purpose the following was the method of proceeding.[1] The foot of a frog being stretched and disposed under the microscope, a saturated solution of common salt was applied to both the dorsal and plantar surfaces of the webs. The salt at first excited constriction of the arteries, but their dilatation quickly supervening, acceleration of the flow of blood in those vessels took place. But the plasma of the blood becoming inspissated by the exosmotic action of the strong salt solution, withdrawing the weaker saline solution from the blood, the red corpuscles aggregated together so as to form a thick viscid mass, which became stagnant in the vessels, filling them like a red injection. The extreme arterial ramifications, the capillaries and veins, it is to be remarked, are, by this process, more fully injected than the trunk of the artery leading to them. The cause of this peculiarity is, that the blood in the larger arteries, flowing with greater force and rapidity, more readily escapes the exosmotic action of the salt; and that when the blood has become stagnant in the extreme arterial ramifications, capillaries, and veins, so as to block them up, the stream in the arterial trunk leading to a given congested spot passes off by some considerable branch above, just as in the case before mentioned, of an artery which has been cut. In the trunk of the artery below the branch by which the stream referred to passes off, down to where stagnation has taken place in it, there may be seen a collection of plasma with only few corpuscles suspended in it, oscillating up and down. This collection of plasma and corpuscles is identical in signification with the so-called internal clot within a divided or ligatured artery.

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[1] See my Essay in "Guy's Hospital Reports," before cited, p. 95.

After exudation of the watery and saline part of the blood, exudation of the fibrinous constituents, in the form of coagulating lymph, takes place.

In explanation of the process of the transudation of the watery and saline part of the blood from the interior of the vessels through their walls, it has been found that saline solutions pass more readily through animal membranes than albuminous solutions. Again, in explanation of the process of exudation of lymph subsequently, it was pointed out by the late Professor Graham, that albuminous matters, when deprived of the salts which always exist mixed with them, are rendered much more diffusible than before.

In inflammation the saline transudation, which takes place first, thus no doubt paves the way for the exudation of lymph which takes place subsequently.

The frog's web, in a state of inflammation, is opaque where stasis has become established, whereas it is unchanged in respect to transparency at the places in which the circulation is still going on freely. As opacity depends on lymph exudation, it thus appears that stasis is a condition on which lymph exudation depends.[1]

The cornea is pervaded with sensitive nerve fibrils derived from the fifth, which have, among other reflex connections, one with the vaso-motor nerves of the arteries of the adjacent conjunctiva and sclerotica. Hence the inflammatory congestion of the conjunctiva and sclerotica which so quickly supervenes on an injury of the cornea. The cornea being non-vascular, congestion does not take place in it. In the course of a keratitis, the cornea, however, may become vascular, owing to the development of new vessels in it in continuity with those of the adjacent part of the conjunctiva and sclerotica; but this morbid vascularity is not a necessary condition, for the cornea may be the seat of exudation only, the congestion on which the exudation of lymph depends being still confined to the adjacent conjunctiva and sclerotica; while in the healing process we may find non-vascular granulations filling up an ulcer, and this followed by cicatrization.

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[1] See Lecture on "Abrasion of the Cornea," in the *Lancet* for January 18, 1879.

As, when the cornea is inflamed, inflammatory congestion of the conjunctiva and sclerotica takes place, so in like manner, when an interstitial morbid process commences idiopathically, congestion of the white of the eye next the affected part of the cornea shows itself. This is owing to reflexion of the irritation of the sensitive corneal nerves to the vaso-motor nerves of the arteries of the adjacent conjunctiva and sclerotica. These arteries thereby become constricted, and inflammatory congestion takes place in the manner before explained.

ARTICLE XIII.

A CONTRIBUTION TO THE CLINICAL HISTORY OF MYOPIA.

By S. D. RISLEY, M.D., Lecturer on Ophthalmoscopy in the University of Pennsylvania; Ophthalmic and Aural Surgeon to the Episcopal Hospital at Philadelphia.

IN the domain of ophthalmology no malady is of greater interest to the surgeon, or of graver import to every civilized community than that of *progressive myopia.* The extreme frequency of its occurrence; the known fact of its acquisition during early life; and its apparently intimate relation to the educational process, have, together with the uncertainty which still hovers over its clinical history, served to elevate it to a first place among the many vexed problems presented to the ophthalmic surgeon for solution. Its great importance has led to the most extended observation and careful collection of statistical information, in the hope that by this means the causes of its production might be discerned and removed.

As early as 1813, James Ware published in the *Philosophical Transactions* his results from the examination of the eyes of 10,000 soldiers. He was followed by numerous other observers, until, in 1876, no less than 52,478 persons had been examined by foreign observers (Emmert). To this large number are to be added the labours of Drs. Derby, Loring, Cheatham, Williams, Prout, and Matthewson, and my own as yet unpublished statistics, in this country. By these extended observations it has been shown conclusively that the percentage of myopia steadily increased from the lower to the higher classes. Thus, in St. Petersburg, Professor Erismann found in 4358 scholars, 13.6 per cent. of myopia in the primary, which had increased to 42.8 per cent. in the higher classes. In Germany the rise was from 11.1 per cent. to 62.1 per cent. The American statistics already published furnish a more favourable result than the above, but are, nevertheless, sufficient to excite the gravest foreboding; commencing, as they do, with myopia of 3.55 per cent., and rising to 26.79 per cent.

Thus far, however, the results attained by all observers agree in the main fact that during school life the percentage of myopia steadily and rapidly increased. Beyond this, however, but little information was gained. It is true, many important deductions were made from the carefully collated statistics, which it is not now our purpose to discuss. It also led to much important discussion regarding the hygienic surroundings of school children, and very much of great importance has been written regarding the lighting, seating, text-books, etc., but regarding the essential cause of myopia, and its individual history, it was necessary to do more than examine large numbers of eyes at different ages and different stages of advancement in school-work. The requisite insight into its cause and true history could only be gained by the successive examination of the same eyes at different stages of the educational progress. It was only by such observation that it could be proven beyond peradventure that emmetropia had given place to myopia, or that a hypermetropic eye had become emmetropic or myopic. It was only by this means that the pathological conditions, if any were present, could be traced, and their due importance assigned. There were very obvious difficulties in the way of such observation, but difficulties by no means insuperable. It is to be regretted that a decade has been allowed to pass without the repeated examination of the lower classes, examined by earlier observers, and now constituting the higher grades. In view of the great importance of such observation, I have regarded the following three cases of sufficient value to be placed upon record in the annals of this subject, since any number of cases, however small, in which the actual change from one refractive condition into another was accurately observed, furnish no uncertain light, but are a sure guide toward the truth.

These cases came to me suffering from eye-strain, and the very usual accompanying condition of retino-choroidal irritation or inflammation. A careful measurement under a mydriatic, used until complete paralysis of the accommodation was secured, revealed hypermetropic refraction. A subsequent examination, also made with paralysis of the ciliary muscle, showed an absolute myopic refraction. Two of these cases were situated under the most favourable hygienic surroundings; the third was a medical student, and was subjected to the extraordinary demands of a medical student's life.

CASE I. *Simple Hypermetropic Astigmatism, which under observation gave place to simple Myopic Astigmatism, the meridian of greatest refraction being retained.*—Emily S., æt. nine and a half years, was brought to me in November, 1878, by the advice of her music teacher, who discovered that the child had great difficulty in reading the notes, and believed it was because of her inability to see their position upon the staff. She had also to place her face so near to the sheet in order to see the music at all, as to prevent the skilled and graceful use of the keyboard. She was large for her age; in robust health; living in a home of luxury, and given to out-door sports of the most vigorous kind. In spite of this she had made rapid progress in school, showing unusual intellectual precocity. The hours not actually devoted to out-door play were employed in reading and music. Many books of romance, etc., were eagerly devoured. In the subsequent progress of the case, where this practice was interdicted, she begged that she might at least read *but one book* each week. Her eyes were prominent, irides blue, sclera bluish-white, and the anterior episcleral vessels were injected. The balls, when turned strongly downward, seemed flattened or broader laterally than vertically. She insisted that her eyes were perfectly comfortable; that they were never tired, never pained her; that she never had headache. With each eye $V = \frac{20}{\text{LXX}}$. Jr. No. 1 was read, but with difficulty, from $3\frac{1}{2}''$ to $6''$. At $20'$ lines at 90° (or vert.) were distinctly separated; while at 180° they were blended into a gray stripe.

The ophthalmoscopic record made at that time is as follows: Vert. ves. *Em.*, hor. ves. —3 or 3.5 D in each eye. There is a small central excavation in each nerve, with anomalous emergence of the central vessels. There is a pigment line beyond the outer margin of the nerve in the right eye. The nerve surface was too capillary, and the choroid in places honey-combed.

She was given a solution of atropia sulphat., gr. iv–f℥j—to be instilled three times daily—and return. The following day V had somewhat improved for distance, but no satisfactory correction of the existing error of refraction could be made, so the atropia solution was continued. At this visit she volunteered the statement that her eyes felt a great deal better than before the drops were used—which was a remarkable statement in view of the fact that she had so positively disclaimed all discomfort before, even when urgently inquired of regarding it. To me it illustrated the fact, too frequently ignored, that children do not complain of suffering which would at once drive adults to seek for relief. I have too frequently seen school-children pursuing their daily duties in the public schools of Philadelphia with eyes in worse condition than half the people I had seen in my private office on the same day, yet uncomplainingly performing their severe tasks. My little patient, when only partly relieved from the spasm of the ciliary muscle, felt a comfort which, if ever experienced, she had forgotten. Repeated unsatisfactory attempts were made to select a correcting-glass. At first crossed cylinders were required; but finally, on the sixth day of instillation of the atropia solution, the myopic meridian entirely disappeared. Lines at 180° in place of 90°, as at first, were now distinctly seen, and at 90° faded into a gray stripe, and her correcting-glass proved to be for O. D. $+\frac{1}{13}^{\text{cy}}$ ax. 90°, O. S. $+\frac{1}{16}^{\text{cy}}$ ax. 90°. With these $V = \frac{20}{\text{XXX}}$ each eye, and not so well with any other glass or combination of glasses. Through them the choroidal epithelium was sharply seen with the ophthalmoscope. In short, after the most painstaking care in verifying the correction by numerous methods, I was entirely satisfied with the above as the correcting-glasses. The atropia was discontinued and the glasses ordered. They were to be mounted as spectacles, carefully centred, and to be worn constantly.

Fourteen days later, and again in six weeks, she was seen, her glasses having been worn all the time. At each of these visits the sharpness of vision was recorded as $\frac{20}{\text{XXX}}$. Jr. 1 readily from $3''$ to $14''$, and the ophthalmoscopic record was, at the last visit, "fundus healthy." She was now allowed to return to school, but the glasses were to be constantly worn, and I believe this was faithfully done.

June 27, 1879. She was brought to see me to show how well her eyes were. I noted immediately that the episcleral vessels were dilated, and the ophthalmoscope showed a great increase in the absorption of the choroidal pigment, and that the nerve surface was almost as red as the choroid. The details of the fundus could not be distinctly seen through the correcting-glasses without an additional concave lens, and V had sunk to $\frac{20}{\text{LXX}}$ through them. A 2 gr. solution of duboisia sulphate was ordered to be used twice daily, a pair of smoked glasses to be worn out of doors, and she was sent to the country. In twelve days the condition of fundus was found greatly improved, and with her correcting-glasses $V \frac{20}{\text{XXX}}$. Careful measurement revealed no change in the refraction of the eye.

The duboisia was stopped, and she returned to their summer residence in the country. Three months later—one year from the date of her first visit—she returned with her eyes perfectly well; $V \frac{20}{\text{XXX}}$ with correcting-glasses as above. The intervening time had been spent with a governess, principally out of doors. All her instruction had been oral; she had not been allowed to read. Unfortunately she was now permitted to return to school, but was sent to a kindergarten conducted by a very intelligent German, and strictly after the Froebel system. She was forbidden to read out of school hours, and was allowed her music lesson twice a week and one hour of practice daily—a half hour each morning and afternoon. This was on September 25th. The following January 3, 1880, she was seen again. V had sunk to less than $\frac{20}{\text{CC}} = \frac{1}{10}$. The choroid and retina were once more in a condition of marked irritation, and still further inroads had been made upon the choroidal epithelium. It required for the left eye —2 D to get a sharp image of the fundus and —3 D for the right eye, viewed through the correcting-glasses. Without any glass her vision was $\frac{20}{\text{L}}$. The duboisia solution was again instilled, with the result of again improving the condition of the eye-ground. It was now noted that a marked change had taken place in the shape and size of the porus opticus. The central excavation—which I at first noted as a deep *physiological* excavation, which had at first been small, deep, and nearly circular, with a very irregular emergence of the central vessels—was now shallower, broader, and the peculiar irregularity of the central vessels had disappeared to a great extent. After the most painstaking care in measuring the principal meridians of the cornea, the following formula for glasses proved now to be the necessary correcting-glass:—

$$\text{For O. D.} + \tfrac{1}{16}{}^{\text{cy}}\,\text{ax.}\,105^\circ \;\underline{\big|\qquad}\; - \tfrac{1}{30}{}^{\text{cy}}\,\text{ax.}\,180^\circ\; V = \frac{20}{\text{XXX}}$$

$$\text{O. S.} + \tfrac{1}{36}{}^{\text{cy}}\,\text{ax.}\;\;90^\circ \;\underline{\big|\qquad}\; - \tfrac{1}{15}\;\;\text{ax.}\,180^\circ\; V = \frac{20}{\text{XXX}}$$

The duboisia, which had been used for ten days, was stopped and the above formula for glasses ordered, to be worn constantly. Four days later she returned with her glasses correctly ground and mounted, and with them, with both eyes, $V = \frac{20}{XX}$ through the now nearly normal pupils. She was now watched more carefully than before by requiring frequent stated visits at the office. The mydriatic was stopped on the 15th of January. On the 19th, four days later, $V = \frac{20}{XX}$ p. p. Jr. 1, $4\frac{1}{2}''$. This was steadily maintained until February 14th, when $V = \frac{20}{XXX}$. After examination with the ophthalmoscope it sunk to $\frac{20}{XL}$. The nerve-surface was once more too red. A single instillation of duboisia was made, and a week later the sharpness of vision was once more normal. On March 19th $V = \frac{20}{XX}$ each eye and the fundus healthy. On June 19th, three months having elapsed, during which time she had not been seen, she returned, and V had now sunk with the former correcting-glasses to

$$\text{O. D. } \frac{20}{C} \qquad \text{O. S. } \frac{20}{LXX}.$$

After a few moments' rest in the office vision rose to

$$\text{O. D. } \frac{20}{LXX} \qquad \text{O. S. } \frac{20}{XL}.$$

A concave glass was necessary to have a distinct ophthalmoscopic image of the fundus. After three days' use of duboisia the following change was found to have taken place in the refraction. In O. D. the hypermetropic meridian had been reduced from $H = \frac{1}{16}$ to $\frac{1}{60}$, while the myopic meridian had increased from $M = \frac{1}{30}$ to $\frac{1}{14}$. In O. S. the hypermetropic meridian had entirely disappeared, and the myopic meridian had increased from $\frac{1}{15}$ to $\frac{1}{12}$.

She was then ordered for O. D. $+\frac{1}{60}^{s} \bigcirc -\frac{1}{12}^{cy}$ ax. 15°, O. S. $-\frac{1}{12}^{cy}$ ax. 180°; with these $V = \frac{20}{XX}$ in each eye.

Since writing the above (July 1st) this patient was seen, and V found to remain at $\frac{20}{XX}$.

Here then, directly under observation, a simple hypermetropic astigmatism of high degree, under carefully selected correcting-glasses, passed over into a corresponding degree of simple myopic astigmatism; the meridian which was at first emmetropic becoming myopic, and the hypermetropic meridian becoming emmetropic. Three times was its progress arrested by treatment, but the result is somewhat discouraging, since in spite of treatment and avoidance of work the distension of the ball still advanced. The mother of the child and a paternal aunt both had compound hypermetropic astigmatism.

The case is still under my care, and it remains to be seen whether the lengthening of the eyeballs will still go on into a compound myopic astigmatism. The question of hereditary myopia is excluded in this case, since no instance of myopia could be discovered in the family, and one member at least of each side of the family was proven to be hypermetropic. There was doubtless an intimate relation between the undue eye strain, caused by the high degree of astigmatism present, and the choroidal disease. This in turn interrupted the nutrition of the ball, rendering the distension possible in this rapidly growing girl.

CASE II. *Simple HAs carefully determined under Atropia converted into compound MAs in one year and a half, also determined after Paralysis of Accommodation.*—H. H. K., æt. 17, male, student at Middletown, Ct., consulted me, Oct. 31, 1879, because of weak eyes and failing sharpness of sight. The eyes had become so painful that he had been compelled to withdraw from his college duties, unable to finish the school term. He had $V = \frac{20}{\text{LXX}}$ in each eye and saw horizontal lines best. There was no insufficiency of the internal rectus muscles. The nerve surface in both eyes was intensely capillary, the retina striated and hazy around the nerve, especially along the course of the great vessels and over the inner margin of the nerve which was quite obscured. In O. D. there was a yellowish-red crescent of choroiditis, one-half the width of the disk, embracing its outer half. In O. S. there was a narrower crescent of interrupted pigment deposit, also embracing the outer margin of the nerve. The refraction was noted as myopic astigmatism. The highest meridian, however, was seen with —2 D.

He gave the following history: In March, 1877, during a preparatory course of study at Rugby Academy, in Philadelphia, his eyes had failed him. He consulted Dr. Wm. Thomson, of Philadelphia, who after careful determination under atropia ordered for him $\begin{array}{l}\text{O. D.} + \frac{1}{60}^{\text{cy}} \text{ ax. } 15^\circ. \\ \text{O. S.} + \frac{1}{60}^{\text{cy}} \text{ ax. } 160^\circ.\end{array}$

With these he returned to his work, and was able to prosecute his studies without the least difficulty during the spring and autumn of 1877 and the remainder of the school year in 1878. His glasses, however, had been worn faithfully both for distance and near work. In the summer of 1878 he went to the sea-side, either forgetting or purposely leaving his glasses at home. This he subsequently regretted, but at the time supposed they were no longer necessary, since "his eyes were perfectly well." During the summer he worked persistently preparing for the fall examinations for entering college. He entered upon the duties of his freshman year with much enthusiasm. His eye troubles soon began again and grew rapidly worse until the last of October, when he gave up the painful contest and sought my advice about his eyes. He was in other respects apparently in perfect health. He was given a saline cathartic, a dry cup daily to each temple, and a solution of duboisia gr. ij–f℥j, to be used three times daily. A pair of coquille glasses, dark medium London smoke, were ordered to be worn when in the light. Repeated unsatisfactory attempts were made to correct the error of refraction, until finally on November 19th, after twenty days' use of the drops, part of the time but twice daily, the duboisia was stopped, and the following formula for correcting-glasses ordered to be worn constantly: $\begin{array}{l}\text{O. D.} - \frac{1}{36}^{\text{s}} \bigcirc - \frac{1}{72}^{\text{cy}} \text{ ax. } 105^\circ. \\ \text{O. S.} - \frac{1}{36}^{\text{s}} \bigcirc - \frac{1}{72}^{\text{cy}} \text{ ax. } 75^\circ.\end{array}$

With these $V \frac{20}{\text{XX}}$ each eye, $\frac{20}{\text{XV}}$ with both. His eyes were now entirely free from pain and photophobia, and his fronto-occipital pain had disappeared. The ophthalmoscope marked a corresponding improvement in the fundus. The retinal haze had diminished, although much of the striation remained. The yellowish-red crescent in the right eye had almost faded from view.

He was detained from college until January. On January 31, 1880, $V = \frac{20}{XX}$ each eye with the above glasses, and there was no discomfort of any kind. On the 8th of September he was still entirely comfortable after two terms at school, and $V = \frac{20}{XX}$. His glasses had been worn constantly.

Two lessons are emphatically taught by this young man's history: first, that a hypermetropic eye may become a myopic one; second, the extreme importance and efficacy of careful correction of low degrees of astigmatism. It is almost certain that, had he adhered to the use of the weak cylinders ordered by Dr. Thomson, throughout his school life, or until he had gained his physical majority, he would have been spared his myopia.

It will be noticed further that the meridian of highest myopia, as in the case of Emily S. (Case I.), was the originally emmetropic meridian; the axis of the concave cylinders being placed at right angles to the axis of the convex cylinders at first required. It is highly probable that if his eyes had been neglected his myopia would have continued progressive, and that the crescent of choroiditis would have developed into a typical atrophic conus.

It will be of interest to record here that the father of this young man had H = 1 D in each eye with an astigmatism = .5 D in the right and 1 D in the left eye, axes of cylinder being placed at 105° and 75°. An older brother had H = 1 D in one eye, HAs .75 D in the other eye. A younger sister had a simple HAs in both eyes = .75 D, and the axes of the cylinders were required at 45° and 135°, corresponding very closely to the glass ordered by Dr. Thomson for her brother—the subject of this record. Both of these, the first a theological student, the other attending a seminary for young ladies, were compelled to leave their studies with marked choroido-retinal irritation and severe headaches aggravated by eye work. The young man had been advised to give up his books for travel—his headaches being ascribed to *overwork*. They were both entirely relieved by their correcting glasses. They were both averse to wearing them, especially the young lady; but after repeated trials she frankly and tersely acknowledged that she was convinced that she had her choice between the glasses, or weak eyes with headache. I could discover no history of myopia in the family. The mother has a high degree of hypermetropic astigmatism, and has always been a victim of "nervous headache."

CASE III. *Hypermetropia with High Insufficiency of the Interni, converted into Myopia in both Eyes with low degree of Astigmatism in the Left.*—C. H. B., æt. 24, medical student, came to the University dispensary service on January 28, 1876. He was a first year student, and entirely unaccustomed to the sedentary habits now forced upon him. His eyes had broken down under his work in the middle of his first term. The conjunctivæ were injected, he had headache and photophobia, aggravated by near work. Could still read for a short time by daylight; not at all, without great suffering, by gas-light.

$$\left.\begin{array}{l}\text{O. D. } V=\dfrac{20}{\text{LXXX}},\ \text{Jr. 1, } 5'' \text{ to } 20'' \\ \text{O. S. } V=\dfrac{20}{\text{LXIV}},\ \text{Jr. 1, } 5'' \text{ to } 20''\end{array}\right\} -\tfrac{1}{60}\ V=\frac{20}{\text{XX}}$$

with vertical diplopia there was lateral crossed deviation = 6°. In both eyes the retina was striated and nerve too capillary. There was disturbed pigmentation of the choroid at the outer or temporal side of the nerve in O. D., and an irregular black pigment band embracing the inner half of the nerve. In O. S. there was a grayish-green broadening of the scleral ring extending downward and outward. After prolonged atropinization the sharpness of vision gradually increased until the normal $\frac{20}{\text{XX}}$ was reached, and finally a convex glass was selected $(+\tfrac{1}{48}.)$ It was then noted that the retina had gained its normal transparency. The atropia instillations were stopped, and he was to be further tested for his insufficiency of the interni after the return of the accommodation. He became discouraged, however, and consulted an oculist, who gave him $-\tfrac{1}{48}{}^{s}$ to wear over each eye for distance, no atropia being used, and later prisms of 1.5° over each for reading—and allowed him to return to his books. He steadily grew worse, however, and his prisms were steadily increased until he wore 8° prism over each eye, and finally the externi were divided and his glasses dispensed with. He was relieved in great measure by this procedure, but was at no time able to use his eyes comfortably. He, however, succeeded in passing his examination, and after graduation he became resident physician in one of the city hospitals.

In Jan. 1880, just four years from the time he had applied for treatment at the University Hospital Dispensary, he entered my private class in ophthalmology. I soon discovered that he had great difficulty in using the ophthalmoscope, and on examining his eyes discovered a myopia of 1.5 D to 2 D. He then reminded me that four years before he had been under treatment at the dispensary. I consulted the record of his case, and found the history above given. He was then invited to my office, and a painstaking correction under duboisia made, and the following glasses ordered :—

$$\begin{array}{ll}\text{O. D. } -\tfrac{1}{30}{}^{s} & V=\dfrac{20}{\text{XX}} \\ \text{O. S. } -\tfrac{1}{42}{}^{s} \bigcirc -\tfrac{1}{72}{}^{c}\ \text{ax. } 30^\circ & \dfrac{20}{\text{XX}},\ \text{for constant wear;}\end{array}$$

and—

$$\begin{array}{l}-\tfrac{1}{90}{}^{s} \bigcirc \text{ Pr. } 3^\circ \text{ base in} \\ -\tfrac{1}{72}{}^{cy.} \bigcirc \text{ Pr. } 3^\circ \text{ `` `` for reading.}\end{array}$$

He has since been entirely free from trouble with his eyes, and the constant frontal pain which he had suffered for four years was removed. The black pigment band at the inner side of the right nerve had been to a great extent absorbed, and presented now an irregular succession of pigment heaps with intervening grayish white spaces, and the choroidal circulation was visible throughout a large part of the choroid from absorption of the pigment epithelium.

CASE IV. *Hypermetropic Refraction converted into Myopic Astigmatism.*—Since the above cases were put in type, I was consulted by a gentleman, æt. 28, for whom, in 1875, I had prescribed under a mydriatic convex glasses for reading. He used them for two years with perfect comfort. He then accepted a clerkship, and worked in a dark office through business hours. His headache and weak eyes, for which he had at first consulted me, soon returned, but he worked on in spite of his discomfort until September 1, 1880. I found him with $V=\frac{20}{\mathrm{CC}}$, made worse by his glasses. The ophthalmoscope revealed marked choroido-retinal disturbance. After prolonged use of the mydriatic V increased to $\frac{20}{\mathrm{L}}$, and the actual refractive error was corrected by $-\frac{1}{72}^{\mathrm{sp}} \frown -\frac{1}{72}^{\mathrm{cy.}}$ ax. at 90° in each eye with which glass $V=\frac{20}{\mathrm{XX}}$.

The history of these cases proves at least the possibility of hypermetropic refraction giving place to myopia. In Cases I. and II. the existing astigmatism at the start, and the resulting change in the refraction, it is believed sustained to each other the relation of cause and effect. In Case III. the high insufficiency of the internal rectus muscles was probably the cause of the myopia, since the low degree of simple hypermetropia $=\frac{1}{48}$ was not sufficient to have caused his severe asthenopia and choroidal disease. When first seen the low acuity of vision — $\frac{20}{\mathrm{LXX}}$ was due to spasm or persistent contraction of the ciliary muscles, since under the mydriatic the acuity steadily increased to the normal standard, and once more fell below it, and a convex glass was required.

The muscles of accommodation and convergence being under the same innervation he found it impossible to exert the necessary force with the weakened internal recti to avoid diplopia without, at the same time accommodating for a relatively too near point, thus simulating myopia, preferring an indistinct single image to double images, this being the only alternative. The constant tension thus maintained soon brought about the choroidal irritation, and produced the severe asthenopia. The myopia at first consisting only of tonic contraction of the ciliary muscle and increased convexity of the lens gave place finally to an actual permanent distension of the eyeball with semi-atrophic changes in the choroid as shown by the absorption of the large pigment crescent at the outer side of the nerve, and the honey-combed appearance of the entire choroid.

Article XIV.

Diagnostic Significance of a Dilated and Mobile Pupil in Epilepsy.

By Landon Carter Gray, M.D., Lecturer on the Nervous System, Long Island College Hospital.[1]

It has frequently occurred to me, as it has probably to others who are interested in diseases of the nervous system, to be in uncertainty as to whether the convulsive seizures of a patient were epileptic or epileptiform. As it is the exception to the rule that the physician himself sees the patient in the convulsion, he must rely upon the statements of the patient's friends or relatives for all the details; and be the friends and relatives even fairly intelligent, there are a goodly number of cases about which their testimony is not decisive. When these friends or relatives are careless, unobservant, it may be stupid, the difficulties in the way of an exact diagnosis may become great. Thus, for this reason, I treated a young girl for over a month in doubt as to the nature of her convulsions, being rather inclined to believe that they were epileptic, until I was summoned whilst she was in a hysterical fit. But the history may be good, and we may yet be in doubt as to whether we have before us a true functional epilepsy, or one in which the symptoms are produced by persistent organic lesions. If, therefore, there be any one phenomenon which is constantly or generally present in true functional epilepsy, and not in that which is due to organic disease, it has seemed to me that such a phenomenon would do considerable service to the clinician. Such a symptom, if my observations be trustworthy, is a dilated and mobile pupil. *By this I mean a pupil which changes from contraction in a bright light to dilatation in a shaded light much more quickly than the normal pupil, sometimes instantaneously, undergoing the changes from dilatation to contraction with the same facility, and which is, moreover, moderately dilated even in a bright light.* I have examined seven epileptics in my practice, twelve at the Flatbush Lunatic Asylum, and, thanks to the kindness of my friend, Dr. Guy D. Daly, thirty at the Flatbush Hospital for Incurables, making forty-nine in all. In all but four of these the pupil had the characteristics which I have described. I am not certain that three of these exceptions were really exceptions, but the doubt in the matter is such that I do not consider myself at liberty to exclude any, and shall therefore content myself with dwelling upon them somewhat in detail. The three were all dwellers in the Hospital for Incurables, the inmates of which are chronic cases of the worst type, whose histories are necessarily often very imperfect. The first exception was a typical case, lacking the involuntary cry at the outset of the convulsion and the deep sleep subsequent to it. Dr. Daly shared my doubts regarding this patient. The pupils were small, and only slightly mobile. The second and third exceptions were found in two women, whose advanced age, in the one sixty years, in the other sixty-five to seventy, may have accounted for the fact that the pupils were only slightly mobile, being, however, moderately dilated. The fourth exception was presented by a dement in the Flatbush Asylum, who was blind in one eye from advanced and progressive keratitis, and whom I do not therefore hesitate to throw out of account. Even admitting, which it is by no means fair to do, that the three patients were really exceptions, the rule would apply in ninety-two per cent. of the cases.

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[1] Read before the American Neurological Association, June, 1880.

The mobility and dilatation were usually in proportion to the inveteracy and violence of the disease, although not always so. The cases of *petit mal* have exhibited this phenomenon in a marked degree.

I desire to distinctly state that my observations apply only to cases of true functional epilepsy—in other words, to patients who have either the *petit mal*, or the *grand mal*, which usually begins with the involuntary cry, then the sudden supervention of absolute unconsciousness, then the tonic and clonic convulsions, with or without foam at the mouth and biting of the tongue, and, finally, after the paroxysm, a period of deep slumber. I have taken great pains to satisfy myself that my cases in point were of this nature.

By means of this symptom I have been enabled to make a diagnosis in several instances, where the history was either uncertain or where I knew nothing of it, and subsequent examination has confirmed me. I deem myself, therefore, warranted in affirming that this symptom is of peculiar diagnostic value—indeed, a half century ago it would have been called pathognomonic, in accordance with a belief that the spread of our knowledge is shattering—and I commit it to the criticism of the profession in the hope that it may prove of as extended and certain application as I anticipate.

Article XV.

Poisoning by Carbolic Acid; Recovery. Reported by R. Glisan, M.D., Professor of Obstetrics in the Medical Department of the Willamette University, Portland, Oregon.

About 3 P. M., April 25, 1880, I was called to see Charles L., aged 20, who had taken an ounce of pure fluid carbolic acid. Feeling unwell, he had during the day consulted a physician, who directed a purgative mixture, which was placed alongside of a vial containing an ounce of pure carbolic acid, obtained by the patient for sprinkling upon his handkerchief as a preventive of the smallpox. A friend, Mr. McB., administered to the young man the carbolic acid instead of the cathartic mixture. The mistake—a natural one, as the two vials and their contents bore a close resemblance to each other—being discovered by the friend, he gave young L. some milk, raw eggs, glycerine, and ground mustard, and sent for medical aid. Dr. Eaton arrived soon thereafter, and the patient being unable to swallow, he forced down his stomach an additional quantity of milk, by pouring the latter into a rubber bag, held above the patient's head, and communicating with his œsophagus by a rubber tube. On arriving about half an hour after the poison had been taken, I found Mr. Lambert fast sinking into a comatose condition, being unconscious, except when aroused, with short laborious and somewhat stertorous respiration, cool, livid sweaty skin, feeble and almost imperceptible pulse, with a disposition to groan when disturbed. As he had not vomited, and his stomach was full of fluid, I at once pumped out its contents, and, reversing the action of the stomach-pump, forced in a quantity of milk and sweet oil, and pumped it out again. This process was repeated until the stomach was thoroughly cleansed, and then a pint of the same mixture was thrown into it, and allowed to remain, as a demulcent to the irritated mucous membrane.

The after-treatment consisted chiefly in an occasional enema of brandy and milk, and stimulating applications, especially mustard, to the general surface.

He remained in an almost moribund condition until the absorbed part of the poison was eliminated, when he gradually recovered from the coma, and vomited for the first time. On the following morning I saw him at the hospital, to which he had been removed, feeling as well as ever, with the exception of a slight burning sensation in the stomach. I saw him three weeks afterwards in perfect health.

It must be borne in mind that no antidotes were administered in this case. In fact there is no physiological antagonist to carbolic acid when absorbed into the circulation. A full stomach of diluted carbolic acid plainly indicated the use of a stomach pump to get rid of the unabsorbed poison as quickly as possible. This being accomplished so thoroughly I did not deem it necessary to try any doubtful antidotes.

Bartholow says: "The local caustic action is lessened by vegetable demulcents, but not by oils and glycerine." Husemann and Ummethun state that glycerine, oils, and alkalies are useless, but that saccharated lime comes most nearly to a chemical antidote whilst the poison is yet in the stomach. All authorities agree that there is no true antagonist to the acid after absorption has taken place.

The history of this case seems to prove that milk and sweet oil are not to be condemned, at least as diluents until the stomach can be emptied, and as demulcents afterwards. Besides, they have the advantage of being more readily obtained than vegetable demulcents or saccharated lime.

It is a little remarkable that the patient did not vomit until long after his stomach had been emptied of the unabsorbed carbolic acid. This man had evidently swallowed sufficient carbolic acid to kill him had it all been taken into the circulation. In fact I know of no well-authenticated case of recovery, except this one, from a similar dose. Husemann says that even eight grains of the crystallized acid is a dangerous dose. In most of the instances of poisoning by carbolic acid, the quantity and quality of the acid taken are open to more or less doubt. The facts in the foregoing case are susceptible of easy *proof* by the *man who gave the poison, the druggist who sold it*, and *the patient who took it.*

The diluents administered to him could only have postponed for a short time the absorption of the poison. Still this very postponement was useful until his stomach could be evacuated. The saccharate of lime, and a powerful emetic might have been given in the absence of the stomach-pump, but were useless when this instrument had been used. The practical deduction then seems to be that, under like circumstances, no time should be lost in hunting up vegetable demulcents and antidotes, but that *milk* or *sweet oil*, or *both combined*, should be *administered immediately*, and *the stomach evacuated as soon as possible*, with a *powerful emetic*, or, *preferably*, by *the stomach-pump.*

Although having no bearing upon the foregoing case, it may not be without interest to the readers of this Journal to learn that the poor fellow whom I saved a year ago from death, after he had taken an enormous dose of strychnia, by the hypodermic use of the muriate of apomorphia (see *American Journal of the Medical Sciences*, April, 1878), committed suicide about a year subsequently by taking a dose of his favourite poison. I do not know what treatment was adopted at the time of this successful attempt at self-destruction.

ARTICLE XVI.

ANEURISM OF THE ARCH OF THE AORTA, CURED BY REST, RESTRICTED DIET, AND IODIDE OF POTASSIUM AND ERGOT. By R. STANSBURY SUTTON, A.M., M.D., Fellow of the American Gynæcological Society, etc. etc.

MISS MARY LOUISE B., resident in the northern part of this county, aged 21, is of delicate parentage, and possesses a highly nervous temperament. In the autumn of 1873 she was working in the garden, assisting in taking up the winter vegetables. After prolonged exertion in a stooping posture, she suddenly resumed an erect attitude. Instantly she was seized with violent pain in the region of the heart. This pain, in her own language, caused her to "shriek." Faintness immediately followed and she dropped from her feet. The pain gradually subsided. For six months from this date she had repeated attacks of pain and frequently fainted. On one occasion she fell from a porch and narrowly escaped death. During this time she had no medical care.

In the spring of 1874 her disease was diagnosticated as disease of the heart, and her case was looked upon as hopeless.

On the 4th of July, 1874, about nine months after the seizure in the garden, she was brought to my office. An examination revealed an aneurism of *the descending portion of the arch of the aorta.* Her face was of a purplish hue, and all the veins above the clavicle were turgescent. The aneurism was pressing hard against the second and third ribs just to the left of the sternum. Its thrill was distinct, and its impulse was readily discernible from that of the heart. My diagnosis was confirmed by Dr. Daniel Leasure, now of St. Paul, Minnesota. The prognosis was emphatically unfavourable, and Dr. Leasure expressed the opinion that the patient would scarcely survive the summer.

For a year, to the autumn of 1875, she remained in the city under my care. During this time she was secluded from all excitement, and took three times daily from 10–20 drops of fluid extract of ergot and 5 grains of potassium iodide. The ribs were now bulged up above the plane of the chest wall; the thrill was very loud, and the impulse visible in the second intercostal space. It seemed to me that the end was very near. Fortunately I decided upon another effort. She was sent to her home in the country and put to bed at absolute rest for five and a half out of every six hours—the half hour being allowed for quiet walking about her room. Her nourishment was restricted to ten ounces of material, fluid and solid together, for each twenty-four hours. The ergot and potassium iodide were continued. This regime was strictly adhered to for thirteen months.

At the end of this time I visited her at her own home. I found her in bed and reduced to almost a skeleton. An examination revealed the fact that the aneurism was cured, and the action of the heart weak and irregular and giving a distinct anæmic bruit. I put her upon drachm doses of bitter wine of iron, increased her nourishment, and gave permission for her to be up or down at will. This was in the autumn of 1876. Her cure appears to be permanent.

At a meeting of the Allegheny County Medical Society, held at Pittsburgh June 15, 1880, this case was reported and the patient exhibited. A committee consisting of Drs. Thos. J. Gallaher, Andrew Fleming, and S. M. Stevenson was appointed to examine the patient. The committee reported that the aneurism was cured, and that the only evidence of disease at this time was a slight endocardial murmur.

Article XVII.

A Case of Recurrent Femoral Aneurism treated with success by Catgut Ligature of the External Iliac; return of the Aneurism after Four and a Half Years; Cure by laying open the Sac. By Joseph C. Hutchison, M.D., of Brooklyn, New York.

Mr. S. J. C., aged 43 years, came under my observation March 1, 1874, complaining of a tumour situated just below Poupart's ligament on the left side, oblong in shape, and about the size of a hen's egg, presenting all the characteristics of femoral aneurism, which was first noticed two weeks before. He had been seen by Dr. Ingraham, of Flatbush, who recognized the nature of the tumour. The patient attributed the disease to pressure on the groin by a carpenter's rule which he was in the habit of carrying in the left pocket of his trowsers. On the 11th of March, 1874, I applied a catgut ligature to the external iliac, and the pulsation immediately stopped in the tumour and in the femoral artery below. The patient recovered without any untoward symptoms, notwithstanding the peritoneum was accidentally wounded during the operation. The discharge from the wound, which was very slight, was carefully watched during the whole time it continued, but the ligature was not seen, and I believe it was dissolved and absorbed or became encysted. The case was fully reported in the *American Journal of the Medical Sciences* for January, 1876.

Early in September, 1878, the patient, who had been well since the operation, again consulted me on account of an aneurism of the same size and shape, and occupying the same situation as the former one—just below Poupart's ligament on the left side—attended with some pains in the left leg. There was no pulsation in the left external iliac. The pulsations of an artery of considerable size, which seemed to enter the sac, could be felt on the inner side of the aneurism. The pain was relieved by rest in bed for a few days; and during this time *manipulation* of the tumour, as proposed by Sir W. Fergusson, was practised now and again, with a hope of detaching a portion of the coagulum and having it carried into the distal end of the vessel to obstruct it, and thus lead to the gradual consolidation of the tumour. This, however, failed, and on the 7th of September the thigh was *flexed* to the utmost limit and retained in that position by an appropriate bandage carried from the thigh around the body. The leg was straightened from time to time to examine the tumour. On September 18, no perceptible change having been observed in the tumour, a pad was placed over it (so as to increase the pressure), and the flexion was continued. October 15, the bandage and pad were removed and the limb extended—the tumour was a little harder and the pulsation seemed to be slightly diminished.

The treatment by flexion and pressure over the tumour was now abandoned, the limb having been flexed thirty-eight days, and on the 20th of October, five minims of Monsel's sol. sub. sulph. iron (Squibb's), diluted one part to thirty of water, was *injected* with a hypodermic syringe into the aneurismal sac, pressure being made for some time over the vessel which entered the sac on its inner side and on the femoral artery below the tumour. No perceptible change followed the injection. On the 22d, ten minims of the same solution were injected; 26th, fifteen minims; 29th, fifteen minims, one part to twenty. On the 30th the tumour was red, hot, and firmer. November 2d. Direct pressure was made by a bag of shot weighing three pounds, placed over the tumour, which on the 6th was increased to four pounds; tumour smaller and harder. 11th, injected fifteen minims of the iron solution, one part to twenty; weight of shot increased to five pounds. 16th, injected ten minims, one to twenty; 23d, fifteen minims, one to ten; 26th, ten minims, one to five; December 2d, ten minims, one to five. Manipulation, flexion, direct pressure over the tumour having failed to cure the aneurism, the necessity of selecting some other means of cure became necessary.

The patient was very weak from confinement and anxiety, his nervous system was demoralized by the efforts to relieve him which had hitherto been adopted, and the necessity of selecting some treatment which would certainly cure him, seemed to be imperative. Pressure upon the abdominal aorta or upon the common iliac, either through the abdominal walls or by the hand introduced into the rectum, was not resorted to, because the obliteration of the external iliac indicated the free communication of enlarged anastomosing branches in the sac and failure must result, as was subsequently proven. For the same reason, in addition to the dangers of the operation, ligation of the common iliac was deemed inappropriate. Galvano-puncture was rejected, for the reason that the records of cases treated by this method did not show a degree of success which would justify the risks attending this method of treatment. Laying open the sac and securing the vessels at their point of communication with it seemed to be the only procedure that would positively help the patient, and this operation was decided upon after careful consideration of the case in all its aspects.

The operation was performed December 24, 1878, with the kind assistance of Drs. Geo. A. Peters and Gouley, and in the presence of Drs. Minor, Paine, Chas. Jewett, Hutchins, and Waterworth, and my pupil, Mr. Thallon. The limb was first elevated for a few moments so as to drain the blood from it, Esmarch's elastic tube was then applied around the thigh below the tumour so as to control the recurrent hemorrhage when the sac was opened, and the abdominal aorta was compressed by a tourniquet which completely arrested pulsation in the tumour. An incision was now made into the centre of the aneurism large enough to admit the forefinger of the left hand; a free hemorrhage took place notwithstanding the use of the tourniquet, but it was at once arrested by the introduction of the finger which plugged the opening. The incision was then extended a little, and the finger swept around the sac until it pressed upon the point of hemorrhage and thus controlled the bleeding.

This pressure was continued while the sac was freely opened by incisions extending upward and downward, and the clots turned out; some of which were fibrinous and firm, and others red and soft. It was now evident that the hemorrhage came from a single large vessel opening into the sac from its inner side. A rubber bougie was introduced into the mouth of the bleeding vessel, thus completely checking the hemorrhage. In the effort to isolate the vessel so as to secure it with a ligature, a large vein was nicked, believed to be the internal saphenous, from which a troublesome hemorrhage took place, causing considerable delay and necessitating the application of ligatures above and below the wound. The artery was secured with much difficulty by seizing its mouth on either side with tenacula and drawing it forward, the bougie still acting as a plug; a ligature was thrown around it and tightened as the bougie was withdrawn. The sac was sponged out, the tourniquets loosened, and there being no other bleeding points the wound was left open to heal by granulation. The distal end of the artery, from which we expected bleeding to take place, was closed, probably by an embolic clot. The patient did not bear ether well, his respirations were somewhat irregular and slow, and he was greatly prostrated by the loss of blood, chiefly venous, during the operation, necessitating the use of brandy hypodermically, four drachms in all, and its free administration by the mouth as soon as he could swallow. His leg was surrounded with bags of hot oats, and stimulants were freely administered for twenty-four hours. After this the case progressed satisfactorily, and with the exception of some ecchymotic spots that appeared from time to time about the foot, exciting apprehension of gangrene, no untoward symptom occurred. The wound healed as such wounds usually do. The ligature came away on the twenty-ninth day. February 14, the patient went to New Jersey on a visit, and on his return after a few days' absence the toes were inflamed, and there were some spots of redness about the malleoli; rest for a few days with the foot elevated restored the parts to the normal condition.

Remarks.—The above operation was done as a *dernier resort.* Recognizing the force of the maxim "that any remedy is better than none," I decided to give the patient the benefit of the doubt, notwithstanding I was warned by an eminent surgical authority that "I had better let the patient die than kill him." The large vessel which supplied the sac was believed by myself and the gentlemen in consultation to be the profunda, arising from the inner instead of the outer side of the femoral, but subsequent study of the anatomy of the region gives me reason to believe that the vessel ligated was the internal circumflex, coming directly from the femoral instead of having its normal origin from the profunda. J. M. Dubrueil (*Des Anomalies Arterielles*) found in forty-seven dissections that the profunda arose from the inner side of the femoral in seven, equal to fifteen per cent., and Richard Quain (*Anatomy of the Arteries*) found the same anomaly sixteen times in eighty-two dissections, nineteen and a half per cent. Now adding together the observations made by both authors we find that the profunda arose from the inner side of the femoral in twenty-three out of one hundred and twenty nine dissections, seventeen and two-thirds per cent. Quain in three hundred and ninety observations found the internal circumflex coming from the femoral in ninety, or twenty-three per cent. Assuming, then, that the case in hand is explained by these data, the weight of evidence is favourable to the idea that the vessel ligated was the internal circumflex and not the profunda. Dubrueil also states that when one of the circumflex arteries is enlarged the other is proportionally diminished in size, so that if we suppose the internal to have arisen directly from the femoral, while the external arose from the profunda, we would expect the internal to be considerably the larger, and the anastomotic supply much larger than that figured in the books. An interesting point in the case is that, notwithstanding the pulsation in the sac was controlled by the tourniquets which were applied above and below, very free hemorrhage took place as soon as the sac was opened. The same fact was observed in Mr. Annandale's case, reported in the *Lancet*, April 22, 1876. This is explained by the free anastomotic supply of the internal circumflex through the branches of the internal mammary, intercostal, lumbar, and the branches of the internal iliac (obturator and sciatic). The blood supply which reached the sac through the direct inosculations of the branches of the internal iliac with those from the femoral, was probably cut off by the pressure of the abdominal tourniquet during the operation, hence the arrest of the pulsation. It was a fortunate circumstance that but one of the branches arising from that portion of the femoral which was the seat of the aneurism was pervious and bled, the remaining four, as well as the distal end of the femoral, were, I presume, closed by embolic clots. This materially simplified the operation.

REVIEWS.

Art. XVIII.—*The Diseases of the Sympathetic Nervous System.*

1. *Physiology and Pathology of the Sympathetic System of Nerves.* By Dr. A. Eulenburg, Professor of Medicine, University of Griefswald, and Dr. P. Guttmann, Privat. Docent, Univ. of Berlin. Translated by A. Napier, M.D., Glasgow. Journal of Mental Science for July and October, 1878, and January, 1879.
2. *Pathologie Clinique du Grand Sympathique. Étude basée sur l'Anatomie et la Physiologie.* Par le Dr. A. Trumet de Fontarce, Ancien Interne des Hôpitaux de Paris, etc. etc. Paris: Libraire J. B. Baillière et Fils, 1880.
   Clinical Pathology of the Great Sympathetic. A study based upon its Anatomy and Physiology. By Dr. A. Trumet de Fontarce.

As in law, rights founded in fraud become through time and change inalienable, so in science, terms born of ignorance become at length so rooted in language that they cannot be displaced. The expression "sympathetic nervous system" is an illustration of this fact. "Sympathetic," as here used, is a word without definite meaning; and the organs and structures referred to do not come up fully to the anatomico-physiological idea of a "system"—an assemblage of parts composed of the same tissues, intended for similar functions, and independent in action. We shall not, however, hesitate to make use of these terms in the present article, knowing that we cannot be misunderstood.

As a frontispiece, Trumet de Fontarce presents us with an excellent schematic plate of the "great sympathetic." It enables us at a glance to trace the spinal, visceral, and mutual relations of the numerous ganglia and plexuses. A recapitulation of the chief anatomical facts in regard to the sympathetic will not, we believe, for most of our readers be a service unappreciated.

On each side of the anterior aspect of the spinal column, in neck, chest, abdomen, and pelvis, is a chain of ganglia, united by a longitudinal cord, constituting what is sometimes termed the vertebral portion of the sympathetic, the nervus intercostalis of the old anatomists. The cervical ganglia are on each side, three in number, of large size; the thoracic twelve, the lumbar four.

Within the cranium are several well-known ganglia—the ophthalmic, lenticular, or ciliary ganglion within the orbit; the spheno-palatine or Meckel's in the spheno-maxillary fossa; the otic or Arnold's, which lies against the inner surface of the inferior maxillary nerve close to the foramen ovale; and the submaxillary on the submaxillary gland. All these ganglia have branches of communication with the cranial nerves.

The carotid plexus is supposed to be the centre of communication between the cranial ganglia, and also to connect these with the vertebral chain. It is formed from the ascending branch of the superior cervical ganglion, whose branches wind around the internal carotid artery. A branch from the Vidian nerve also comes to the plexus.

According to Ludovic Hirschfeld, the ganglia of the head do not belong to the sympathetic; but it is enough for us to know that the cranial prolongation of the superior cervical ganglion has anatomical connections with the cranial nerves, ganglia, and plexuses. Although, in the present state of our knowledge, it will be rather a pleasing fancy than a useful fact, we may, if we choose, suppose a circle or circuit to be completed by the vertebral and cranial sympathetic, the connection below being made through the *ganglion impar*, on the first bone of the coccyx, and above through the ganglion of Ribes, on the anterior communicating artery.

On or near the great viscera of the chest, abdomen, and pelvis is another series of ganglia and plexuses, called sometimes the prevertebral portion of the sympathetic. Its chief subdivisions, from above downwards, are the cardiac, solar, and hypogastric plexuses. Besides these, however, numerous secondary plexuses are found—the pharyngeal, laryngeal, pulmonary, coronary, splenic, supra-renal, renal, mesenteric, ovarian, vaginal, vesical, etc. These are connected by numerous branches with the vertebral ganglia and with the cerebro-spinal axis. We will, however, only call up a few of the more important of these communications. Superior, middle, and inferior cardiac nerves pass from the cervical ganglia to the cardiac plexuses. The vastly important splanchnic nerves are formed from the visceral branches of the six lower thoracic ganglia.

By some authorities the ganglia situated upon the posterior roots of the spinal nerves have been regarded as belonging to the sympathetic system.

It is most important to remember that the sympathetic system of nerves and ganglia is connected anatomically with the cerebro-spinal axis. The central communications of these two departments of the nervous system are those which are best understood. In the thoracic and abdominal regions these have been best studied; but probably similar connections exist between all parts. *Rami communicantes*, or communicating branches, pass between the spinal nerves and the ganglia which constitute the vertebral chain or trunk. Kesteven, in a short article, entitled "The Sympathetic Centre" (*Brain*, October, 1878), has stated succinctly the facts in regard to the connections between the cerebro-spinal and sympathetic divisions of the nervous system. He divides them broadly into two classes, *central* and *peripheral*, the central being by the rami communicantes, to which we have just referred. The peripheral are those which exist between the various nerves passing from either centre. At no place, according to him, does real union take place between the systems without the interposition of nerve corpuscles.

> "The nerve fibrils may run together, that is, in the same direction, but they are never actually united unless the nerve corpuscles intervene. Such intervention of corpuscles gives rise to secondary ganglionic formations. These formations may vary, in accordance with the number of nerve fibres which have to be united. The otic and submaxillary ganglia are instances of small ganglionic formations; but where this coalescence takes place in the neighbourhood of some large viscus the ganglionic formation is more complex, and has received the name of plexus."

Kesteven also states that the peripheral connections between the sympathetic and cerebro-spinal systems are important and universal. He expresses himself as follows:—

> "There is not throughout the body a single sympathetic nerve fibre which reaches its destination without previous admixture or fusion to a certain extent

with nerve fibres from the cerebro-spinal system. This fusion or admixture is brought about by the various ganglia and plexuses which are scattered throughout the body."

Although these statements have not been thoroughly proved, yet much physiological and pathological evidence would seem to support them, and we introduce them here because we wish forcibly to emphasize the interdependence of all parts of the nervous system.

Napier's translation of the essay of Eulenburg and Guttmann appeared first in the English *Journal of Mental Science* for July and October, 1878, and January, 1879, and has quite recently been published in book-form. The translator, in a foot-note, informs us that it was for this essay that the Astley Cooper Prize for 1877 was originally awarded to Drs. Eulenburg and Guttmann—a decision, however, which was subsequently overthrown on the technical ground that the paper was the work of *two* authors and not of one only, as the terms of Sir A. Cooper's will seem to require. That the essay was worthy of the prize no one that becomes familiar with it can for a moment doubt. Both as regards the original work done, and the study of literature made, it is a masterly performance.

Part I. of the essay treats of the physiology of the subject, and Part II. of its pathology. Under the head of Physiology we have discussed (1) the cervical sympathetic, and (2) the thoracic and abdominal parts of the sympathetic system; under Pathology various symptoms, lesions, and diseases are brought forward, but these we will hereafter present in detail.

We will first pass quickly in review the most important observations on the physiology of the cervical sympathetic as they are presented by Eulenburg and Guttmann.

Pourfour du Petit showed that the cervical sympathetic had some control over the movements of the pupil; a fact re-discovered by Biffi. in 1846, who found that division of the nerve caused contraction of the pupil, irritation of its peripheral end, dilatation. Budge and Valentin demonstrated further that the pupil thus made to contract, can be again slightly dilated by mydriatics, such as atropia. The usual explanation of these observations is that they are brought about by branches of the cervical sympathetic, which supply the dilator muscle of the pupil. Budge pointed out that these fibres issued from the spinal cord, in the region called the inferior cilio-spinal centre, between the sixth cervical and seventh dorsal nerves. Claude Bernard placed an oculo-pupillary centre, at the level of the first and second dorsal vertebræ. According to Salkowski, the cilio-spinal centre must be above the atlas; Eulenburg and Guttmann concluded that the zone of the spinal marrow, the wounding of which has an influence on the sympathetic pupillary branches, does not extend below the second dorsal vertebra; but at present its upper boundary cannot be specified with certainty. Budge accepts a cilio-spinal centre connected with the hypoglossus by a communicating filament. Budge and Claude Bernard have shown that the connection between the inferior cilio-spinal centre and the sympathetic takes place through the communicating branches of the anterior spinal roots. Salkowski holds that the oculo-pupillary and vaso-motor filaments are the same. Claude Bernard called attention to the fact that contraction of the pupil after division of the sympathetic is constantly accompanied by retraction of the globe of the eye, flattening of the cornea, and decrease in the size of the palpebral fissure. The same phenomena he saw also after division of the anterior roots of the two first dorsal nerves and after section of the spinal marrow at the level of the first and second dorsal vertebræ. Irritation of the divided sympathetic, or of the peripheral ends of the severed anterior roots, gave opposite results—prominence of the globe, bulging of the cornea and enlargement of the palpebral fissure.

H. Müller has discovered orbital muscles, which have their nerve supply from the sympathetic, and which act to throw the eye forward. Sappey has described similar muscles in the orbital aponeuroses.

Some physiologists, as Romberg, Remak, and Schiff, ascribe to the cervical sympathetic a tonic influence on the voluntary muscles of the eye.

Claude Bernard, Schiff, Eulenburg and Guttmann, and others, have shown that division of the cervical sympathetic produces dilatation of the vessels of the head and neck, and a considerable elevation of temperature, of the side operated on. According to Bernard, these results were due to increased flow of blood to the parts because of vaso-motor paralysis: lowering of temperature, on the other hand, being the result of contraction of the vessels, in consequence of irritation of the divided cervical sympathetic.

Goltz's view is as important as it is revolutionary. According to this authority, dilatation of bloodvessels, elevation of temperature, etc., are due to an active process, to stimulation of vaso-dilator nerves. An acceptation of these views must change considerably our ideas in regard to some vaso-motor disorders. Goltz would explain the fundamental experiment of Bernard, which showed that division of the sympathetic caused dilatation of the vessels of the head and elevation of temperature on the injured side, by the persistent irritation of vessel-dilating nerves caused by the incision. Eulenburg and Guttmann repeated the fundamental experiments on the cervical sympathetic, with special view to determining the question whether the vaso-motor nerves are, or are not, vaso-dilator in character. They took certain precautions and adopted certain methods not used by former experimenters. In their investigations on the cervical sympathetic they abandoned the ordinary thermometer and used exclusively a thermo-electric apparatus. Their experiments, both on the cervical sympathetic and on the sciatic nerve, led them to decide against the opinions of Goltz and his followers in regard to the existence of vaso-dilator, and in favour of the usual older view of vessel-contracting nerves.

They call in question the conclusions of Brown-Séquard, according to which, *irritation* of the surface of the brain produced the appearance of paralysis of the same side. It will be remembered by those familiar with the literature of vaso-motor research, although the investigations are not here specifically referred to, that Eulenburg and Landois (*Centralbl. f. Med.*, 1876, p. 166), and Hitzig (*Ib.*, p. 323), performed experiments which seemed to indicate the existence, in the motor zone of the cortex, of heat-controlling centres, vaso-motor or special, destruction of which caused elevation and irritation, lowering of temperature in the opposite extremities. When discussing the vaso-motor branches of the cervical sympathetic, although they admit in another place the indecisive results of their own experiments, Eulenburg and Guttmann assert their belief not only in a great vaso-motor centre in the medulla oblongata, but also in localizable districts on the brain surface, in which it is not improbable that the sympathetic vaso-motor branches terminate. Why should not vaso-motor acts be under the control of the brain as certainly as the gross movements of the limbs and face?

Under the head of vaso-motor branches of special organs, we have a *résumé* of investigations by Wegner, Adamück, Grünhagen, Hippel and Grünhagen, and Sinitzin on intraocular pressure; by Donders and Callenfels, Nothnagel, Schultz, Riegel and Jolly, and Fischer, on intracranial pressure in connection with vaso-motor branches of the brain and its membranes; by Prussak on the vaso-motor branches of the ear; by Claude Bernard, Ludwig, Pflüger, Heidenhain, Prevost, Vulpian, Herzenstein, Wolferz, Demtschentko, Valentin, Reid, Volkmann, Brown-Séquard, and others on vaso-motor branches concerned with secretion and nutrition, or according to the position taken, on special secretory and trophic nerve-fibres.

We will only have space to refer to a few of these important investigations. The following paragraph embodies the views of the authors in regard to the vaso-motor branches of the eye:—

> "Irritation of the cervical sympathetic sets two apparatuses in action, which, in relation to the intraocular pressure, so oppose each other that, according as the energy of the one or of the other preponderates, increase or diminution of the pressure follows. The one apparatus, the vaso-motor, lessens the pressure; the second, situated apparently in the internal muscles of the eye (in the accommodation apparatus), augments the pressure."

On the whole, the weight of published testimony, as here presented, would seem to indicate that the cervical sympathetic was connected with the innervation of the cerebral bloodvessels, and hence its irritation or division would have an effect on intracranial pressure.

Prussak has proved that the vessels of the cavity of the tympanum become dilated after division of the cervical sympathetic of the same side.

Although we have no statement of opinion from them, the evidence presented by Eulenburg and Guttmann would seem to favour the view ot the existence of special secretory and trophic fibres, independent of true vaso-motor fibres. We will give a few of the facts. The secretion caused by irritating the nerves can be produced in glands which have no circulation. Pflüger discovered that certain nerve-fibres terminate directly in the cells of the gland. Heidenhain has proved that stimulation of the nerves of secretion, especially of those cerebro-spinal glandular nerves which excite a very fluid secretion, leads to a change of the protoplasmic cells into mucus-cells (by mucus metamorphosis of the cell contents), and to further division of the newly-formed cells.

It is supposed by some that in the cervical sympathetic are included certain nerve-fibres which convey influences which *accelerate the heart's action*. V. Bezold particularly has advocated an excito-motor apparatus of this kind.

Lepine, with Bochefontaine and Triden, have found that irritation of certain spots on the surface of the brain gave rise, among other phenomena, to *acceleration of the heart's beat.* Eulenburg and Guttmann, however, instead of arguing from this, with v. Bezold, for the existence of a cerebral centre for the cardiac accelerating branches of the sympathetic nerve, hold that it is more probable that we have to do rather with simple cortical vaso-motor centres, the acceleration of the heart's action following irritation of these being regarded only as the result of the increase of the arterial pressure.

The experimental observations on the functions of the cervical sympathetic nerve in man, although interesting, are not very convincing. They have an important bearing on some practical electro-therapeutical problems, beside their interest in physiology. They were principally conducted on living men by percutaneous faradization, or galvanization of the cervical sympathetic. It is almost impossible to say that the sympathetic has been isolated by such a method.

A few observations are recorded of the effect of direct electrical irritation of the exposed cervical sympathetic in executed criminals. These, in general, support the physiologists.

Compared with the fulness of their exposition of the facts pertaining to the cervical sympathetic, the space devoted by Eulenburg and Guttmann to the physiology of the thoracic and abdominal parts of the sympathetic is limited. We will quote their general statement of this portion of their subject.

> "According to their physiological functions, so far as we know them, we can distinguish the following varieties of branches in the thoracic and abdominal sympathetic nerves:—
>
> 1. Excito-motor branches of the thoracic and abdominal viscera.
> 2. Movement-controlling (regulating) branches.
> 3. Vaso-motor (or secretory and trophic) branches.
> 4. Sensory branches, acting reflexly."

According to Budge, Donders, and v. Bezold, the trunk of the sympathetic in its whole length, as far downwards as the lumbar region, contains fibres, the irritation of which accelerates and strengthens the contractions of the heart. Nothing is certainly known regarding the influence of the sympathetic in movements of the stomach; but the peristaltic movement of the intestines, though automatically excited through the parenchymal ganglia, seem capable of receiving accelerating influences from the thoracic and abdominal sympathetic.

Movement-controlling branches are of two kinds: (*a*) the direct inhibitory, and (*b*) those which act reflexly, or reflex inhibitory nerves. The splanchnic is generally considered a direct inhibitory nerve; but as it is also the vaso-motor nerve of the small intestine, the lessening of arterial blood supply following its irritation, might be regarded as indirectly the cause of the decrease or arrest of the peristaltic action which results. Goltz, by striking the skin of the abdomen, or exposed abdominal viscera of frogs, produced temporary diastolic arrest of the heart's action, and hyperæmic dilatation of the vessels of the abdomen—reflex inhibitory effects.

Eulenburg and Guttmann conclude that the vaso-motor or secretory and trophic branches of the thoracic and abdominal viscera are distributed for the most part, if not entirely, by the sympathetic—the plexuses and peripheral branches of the thoracic and abdominal portions.

Brown-Séquard concluded after experiments that the vaso-motor nerves of the lungs are not distributed in the vagus, but through the cervical portion of the spinal cord and the first thoracic ganglion of the sympathetic. Bischofswerder concluded that the vagus as well as the sympathetic, acts as a vaso-motor nerve of the lung. According to Brown-Séquard the vaso-motor nerves of the lungs appear to have a cerebral origin. He repeatedly saw pneumonic infiltration, hemorrhages, and œdema of the lungs, after injury to the base of the brain. Nothnagel made the same observations after injury to a certain spot on the surface of the rabbit's brain; sometimes nearly the whole lung was infiltrated with blood.

The splanchnic is the principal vaso-motor nerve of the body. Its centre appears to be in the brain.

On the whole, after a full presentation of the facts, Eulenburg and Guttmann conclude that experiment supports the view that the vaso-motor or secretory nerves of kidneys and liver have separate cerebral centres.

The fact of the existence or non-existence of sensory or afferent fibres in the sympathetic is one that has some bearing upon the question of the independent action of the sympathetic. If it could be shown that sensory filaments from the extremities or the viscera, or both, passed through the sympathetic trunks and terminated in sympathetic ganglia, from which ganglia afferent fibres, either motor, vaso-motor, or of other character, began, we might have some reason for elevating these ganglia, cords, and plexuses to the dignity of a "nervous system." According to Eulenburg and Guttmann, the sensory fibres of the heart and viscera are almost exclusively connected with the vagus. The sensory fibres for the abdominal viscera are, however, for the most part distributed by the sympathetic system. For the stomach only, the pneumogastric is to be regarded as a nerve of sensation. It is not at all improbable, even with regard to the stomach, that sympathetic branches from the solar plexus take part in the sensory innervation of the stomach. The sensory fibres of the intestines, according to Ludwig and Haffter, and Nasse, proceed from the splanchnic nerves. According to Budge the sensory or reflex nerves of the bladder and urethra emerge from the spinal cord with the third and fourth sacral nerves, and join the hypogastric plexus and lumbar part of the sympathetic. Irritation of the latter produces reflex contractions of the bladder, which do not appear after the third and fourth sacral nerves have been divided. Gianuzzi, also by irritating the branches passing from the sympathetic to the hypogastric plexus, obtained contractions of the bladder, occurring more slowly, and only after more powerful irritation than when the second, third, and fourth sacral nerves were operated on.

When speaking of sensory branches (acting reflexively) of the thoracic and abdominal sympathetic nerves, Eulenburg and Guttmann refer as follows to this question of the independence of the sympathetic.

> "In passing we shall here mention that formerly, when a greater degree of independent action was generally attributed to the sympathetic nervous system, even by eminent physiologists (Bidder, Volkmann), it was regarded as the centre not merely of motion, but also of sensations, for all the vegetative organs of the body. It is clear that at the present day we can no longer accept this view; and just as little importance can be attached to that of Küttner and Volkmann, regarding the possibility of a 'cross-conduction' (quer-leitung) by transference of sensory impressions from the sympathetic to cerebro-spinal fibres. We can now only regard it as possible that sensory filaments pass through the sympathetic to the cerebro-spinal system, notwithstanding that these cerebro-spinal offshoots, and the central terminations of the sensory fibres of the sympathetic (as, for instance, those contained in the splanchnic), are still to a great extent unknown to us."

In the second part, Eulenburg and Guttmann discuss a number of diseases which are certainly or probably connected with the sympathetic nervous system.

> "This connection may result—1st. From the presence of symptoms which resemble, or are identical with, those which we recognize as expressions of the physiological function of the sympathetic, and which we have enumerated and explained in the former part of this essay.
>
> "2dly. From pathological anatomical changes in the sympathetic nerve.
>
> "Those conditions usually go together, but not invariably; thus, the pathological alterations may be completely wanting, or, on the other hand, they may

be found in cases which were not before suspected to have any connection with the sympathetic system."

The following affections are discussed: Functional disturbances in the domain of the cervical sympathetic, including (*a*) compression of the cervical sympathetic by tumours, (*b*) injuries to the cervical sympathetic, and (*c*) injury or disease of the cervical part of the spinal cord; unilateral hyperidrosis, hemicrania, glaucoma, neuroretinitis, ophthalmia neuroparalytica, progressive facial hemiatrophy, progressive muscular paralysis, exophthalmic goitre, angina pectoris, Addison's disease, diabetes mellitus; hyperæsthesias of the sympathetic system, including various forms of colic and neuralgia; anæsthesias of the sympathetic system; reflex paralysis, facial spasm, diphtheritic paralysis, progressive locomotor ataxia, epilepsy; pathological changes in the sympathetic in some infections and other diseases, as syphilis, leukæmia, pellagra, tuberculosis, cardiac disorders, and sunstroke.

Eleven pages are taken up with a consideration of cases of compression and of injuries to the cervical sympathetic, and of injury or disease of the cervical part of the spinal cord. Most of the cases bear out more or less fully the physiological observation, already discussed. The well-known case of gunshot wound of the right sympathetic, reported by Mitchell, Morehouse and Keen, is given in detail. The wars of Germany have furnished several new cases put on record by Kämpf, Seeligmüller, Bernhardt, and others.

Hutchinson made the important observation that cases of traumatic paralysis of the brachial plexus are usually associated with paralysis of the cervical sympathetic, which manifests itself by myosis, with loss of mobility of the pupil, by narrowing of the palpebral fissure, and by a rise in the temperature of the corresponding side of the face. Seeligmüller, who appears to have made a special study of cases of injury and disease of the cervical sympathetic, afterward confirmed Hutchinson's statements.

Cases of unilateral or localized sweating, or hyperidrosis, seem in some instances to be dependent upon true affections of sympathetic. Ebstein has recorded the case of a man who suffered from hyperidrosis of the left side which accompanied angina pectoris. Microscopic examination of the ganglia of the left sympathetic revealed the presence of extremely varicose and dilated vessels. Ebstein believes that these varicosities receive, at different times, a blood supply of varying amount. When the quantity is abnormally great, some of the sympathetic nerve elements must be temporarily compressed and so paralyzed.

Good reasons can be advanced for supposing at least some of the forms of migraine to be due to disease or disturbance of the cervical sympathetic. Du Bois Reymond, from a study of his own case, concluded that his migraine was caused by a tetanus of the muscular coat of the vessels on the affected side of the head, or, in other words, tetanus in the region supplied by the cervical part of the sympathetic nerve. He has proposed the name of *Hemicrania Sympathetico-tonica* for those cases resembling his own. Mollendorff has set up a theory of migraine the opposite of this. According to him, migraine is due to a unilateral *loss* of energy in the vaso-motor nerves governing the carotid artery, whereby the vessels are relaxed and permit an increased flow of arterial blood to the head. These cases, Eulenburg and Guttmann suggest, might be called *Hemicrania neuroparalytica* or *angio-paralytica*, as opposed to cases like that of Du Bois Reymond. Anæmia, in the one case, hyperæmia, in the other, is present. Caffeine, quinia, and ergot are particularly indicated in the neuro-paralytic or angio-paralytic cases of migraine, the remedies probably acting by increasing arterial tone, and thus decreasing the quantity of blood in the vessels of the brain. For the sympathetico-tonic variety, nitrite of amyl would seem to be indicated, acting by paralyzing the vaso-motor nervous system, and thus relieving the tetanic spasm. Drinking freely of warm water, and inhaling carbonic acid, act in a similar way to the nitrite of amyl. The constant galvanic current can be used in both forms, the method advised by Holst being probably the best. In hemicrania sympathetica-tonica the anode is placed over the cervical part of the sympathetic, the other electrode being held in the hand. In the neuro-paralytic form, the cathode is applied to the sympathetic.

The connection which exists between glaucoma, neuro-retinitis, and ophthalmia neuro-paralytica, and functional disorders in the domain of the cervical sympathetic, is imperfectly known. Some interesting cases and observations are, however recorded.

Brunner has lately recorded one striking case of unilateral atrophy of the face, which he believes pointed to a condition of permanent irritation of the cervical sympathetic. Usually this affection has been attributed to the vaso-motor nerves of nutrition included in the trigeminus.

In five cases of progressive muscular atrophy, positive changes of the sympathetic were found; but to these are opposed sixteen negative statements. The question as to the primary or secondary implication of the sympathetic remains to be decided.

With reference to pseudo-muscular hypertrophy, with the evidence before us, we incline to believe with Friedreich and Gowers that the affection is a primary disease of muscular tissue. Eulenburg and Gowers give a few interesting facts in regard to this disease.

If any disease, for physiological reasons, deserves to rank as an affection of the sympathetic nervous system, exophthalmic goitre would seem to have a claim to that distinction. Its three cardinal symptoms—palpitation of the heart, swelling of the thyroid gland, and protrusion of the eyeball—are all manifestations comparable or analogous to the effects produced by certain experiments performed upon the cervical ganglia or nerves, and to which we have already directed attention. The question of the influence of condition of the sympathetic nerves and ganglia in the production of Basedow's disease is very clearly and ably stated. The dilatation of bloodvessels and elevation of temperature, which follow division of the cervical sympathetic, both have their analogies in this affection. Strangely pulsating, tortuous, and prominent little arteries in the region supplied by the carotid, but especially in the swollen thyroid gland, are often present; Paul, Teissier, Cheadle, and Eulenburg and Guttmann, have observed a rise of temperature in a number of cases. Exophthalmos, it will be recalled, did not result from division of the cervical sympathetic, but only from electrical stimulation of the central end of the divided nerve. We have then in the disease two apparently contradictory conditions; but Eulenburg and Guttmann offer an ingenious and to a certain extent satisfactory explanation; namely, that the centre for the oculo-pupillary fibres of the cervical sympathetic (centrum cilio-spinale) is in a condition of irritation, while, on the contrary, the centre for the vaso-motor fibres is in a state of paralysis. For such a state of affairs we have many analogies in the pathology of the peripheral nervous system.

Eulenburg and Guttmann, however, conclude that we are not justified in regarding the exophthalmos of Basedow's disease as *entirely* due to a state of irritation in the sympathetic, because experiment indicates that every state of irritation in a nerve passes gradually into the opposite condition of paralysis. The extreme prolapsus found in the disease does not result from experimental irritation of the cut nerve. After a fair discussion of the question, they decide that it is extremely probable that three conditions—spasm of the unstriped orbital muscles, venous hyperæmia, and increase of the fatty tissue in the orbit—all co-operate in the production of exophthalmos.

A peculiar phenomenon to which v. Gräfe first directed attention indicates the participation of the sympathetic in the production of exophthalmic goitre. In health, the upper eyelid follows closely the movements of the eyeball; in exophthalmic goitre this consentaneous movement of the eyelid is wanting, the defect being due, according to v. Gräfe, to disturbed innervation of Müller's unstriped orbital muscles. To the same cause, v. Gräfe refers the inflammatory and ulcerative affections of the eye, which sometimes, but not often, are phenomena of the disease.

Dilatation of the pupil accompanies exophthalmos experimentally produced; in exophthalmic goitre it is always, or nearly always, absent. The only explanation offered is the statement that the pupillary fibres are not involved in this affection.

The palpitation of the heart they prefer to attribute, not to irritation but to paralysis of the cervical sympathetic.

> "The increased action of the heart may be interpreted as due to a variety of *paralysis* in the cervical sympathetic; paralysis of the cardiac sympathetic nerve fibres leads to dilatation of the cardiac vessels (the coronary arteries), and therefore to a greater flow of blood to the muscular tissue of the heart, and thus to stimulation of the cardiac ganglia."

The chapter on exophthalmic goitre is concluded by a brief description of the pathologico-anatomical changes found in thirteen cases of the disease. In nine of these changes were present; in four nothing abnormal was found. The changes almost uniformly found in the nine cases were increase of connective tissue and atrophy of nerve cells and nerve fibres.

A review of the physiological and pathological evidence leads us to the somewhat indefinite conclusion that the disease of Basedow and of Graves is sometimes a primary affection of sympathetic ganglia or nerves, but that, in many cases, these parts are only coincidently or secondarily involved.

Eulenburg and Guttmann, Chvostek and Meyer, claim to have obtained good results in exophthalmic goitre from galvanizing the sympathetic.

The following paragraph announces the standpoint from which Eulenburg and Guttmann discuss angina pectoris:—

> "The disease described by Heberden (1768) as Angina Pectoris, which is sometimes termed Stenocardia, is not an anatomically definable cardiac affection, but rather a group of symptoms, originating in very different, and for the most part unknown conditions. Although, therefore, we include a short account of it in this essay, we do not wish to indicate it as our belief that it is caused exclusively by changes in the sympathetic system, but that it seems to us that the latter, inasmuch as it takes the principal part in the formation of the cardiac plexus—which is almost certainly the starting-point of angina pectoris—is undoubtedly in some way connected with the occurrence of the phenomena under consideration."

The relation of symptoms to lesion, and what might be called the mechanism of the manifestations, in angina pectoris, are elaborately explained.

A theory has been advanced that Addison's disease is an affection of the nervous system, especially of the great abdominal plexuses of the sympathetic. A close relation exists between the nerves of the supra-renal capsules and these abdominal plexuses. The ganglion semilunare sends a considerable number of twigs to the supra-renal bodies, and these form a close network which is richly supplied with ganglia. Experimental physiology and pathological anatomy seem, however, on the whole opposed in regard to Addison's disease being an affection of the abdominal sympathetic. Eulenburg and Guttmann seldom produced the symptoms of Addison's disease by extirpating the abdominal plexuses in animals. They give details of twenty cases in which morbid changes were found in the sympathetic, and also of cases in which nothing was found.

In animals diabetes mellitus may be produced by wounding the floor of the fourth ventricle of the brain, by making incisions in the spinal marrow at various parts from the medulla oblongata downwards to the level of the lumbar vertebræ, and by injuring the cervical and upper thoracic ganglia of the sympathetic.

In regard to the question whether or not diabetes in man is in any way dependent on disease of the sympathetic nervous system, Eulenburg and Guttmann hold that this is the case in those forms which are analogous to diabetes in animals after injury to the central nervous system. Probably, also, they hold, that many forms of toxic diabetes (as by carbonic acid poisoning) and the rare forms of intermittent diabetes (the analogues of other intermittent neuroses) may be due to some other affection of the vaso-motor nerves.

The various forms of colic—lead, hysterical, menstrual, hemorrhoidal—and cardiac, cœliac, spermatic, urethral, and uterine neuralgias, have been described by Tanquerel des Planches and Romberg, as hyperæsthesias of the sympathetic. Eulenburg and Guttmann, in criticizing Romberg's attempt to include a large number of visceral diseases under hyperæsthesias of the sympathetic, show that this theory is clearly founded on the error that the essential element is disturbance of sensation, and that the motor phenomena are merely accidental or secondary. "Colic," they say, "is just as little a hyperæsthesia of the mesenteric plexus as angina pectoris is of the cardiac plexus; it is rather a compound sensori-motor neurosis."

They protest against the readiness with which the term "reflex action" is used in explaining any uncertain phenomenon in the domain of the sympathetic.

Anæsthesias have been erected into a special group, which is referred to by Eulenburg and Guttmann, but with them, we "cannot conceal our impression that every condition necessary to such a nosological arrangement is wanting."

The sympathetic has even had claimed for it an important *rôle* in the production of certain forms of motor disorder in the striped voluntary muscles. Paralyses occurring in connection with some affections of the intestines, and the urinary and sexual apparatus, have been ascribed to disease of the sympathetic by Willis, Whytt, Prochaska, Romberg, Remak, and others. Remak believed that all voluntary muscles were under a tonic influence proceeding from the sympathetic. Great, however, as may have been some of the work of Remak, it is impossible to accord any large degree of faith to his remarkable doctrines in regard to the sympathetic.

Duchenne believed that in a number of cases of locomotor ataxia, the cervical sympathetic must be regarded as the starting-point of the morbid processes, inferring this from the frequent occurrence of the oculo-pupillary symptoms. He supposed that the sympathetic was, in the first place, functionally affected. "He leaves quite unanswered the important question why we should not rather consider the pupillary, vaso-motor, and uro-genital centre situated in the spinal marrow as the points of origin of the functional anomalies connected with atrophy." Remak described a special form of tabes as *tabes sympathetica* (identical with the so-called hysterical tabes), which occurs almost exclusively in the female sex.

The angio-neurotic nature of epilepsy; the changes in the sympathetic in syphilis, and other constitutional diseases; and the state of the cervical sympathetic in persons dying suddenly from sunstroke, are subjects which receive brief attention from Eulenburg and Guttmann, and are worthy of further development at other hands.

The volume of Trumet de Fontarce is greater in bulk than that of Eulenburg and Guttmann; it is not, like the essay of the latter, based in part upon original experiments; and instead of the clear and condensed *resumé* of the subject presented by the German authors, we have a volume inflated to nearly four hundred pages by immense quotations and irrelevant matter. The manufacturing of bulky volumes, in which a neat rivulet of the author's text meanders through a meadow of quotations, is evidently not confined to American aspirants to medical fame.

The French author has managed to include a much larger number of affections in his positive classification than Eulenburg and Guttmann were willing to consider as having any connection, near or remote, with the sympathetic.

The essay of Eulenburg and Guttmann having been handed in for the Astley Cooper prize for 1877, in October, 1876, contains no references to papers since published. It is, however, up to the date mentioned, fairly overflowing with information from original sources. German authorities hold the most prominent place, but France, England, the United States, and other countries, have by no means been neglected. The book of Trumet de Fontarce contains some valuable recent references, but the author has drawn most largely from French text-books and treatises. The names of Lobstein, Poincaré, Jaccoud, and a few others, meet us at every turn. A rapid review of the contents of the book will serve to show its ambitious scope.

The first sixty-six pages are devoted to general considerations. A *resumé* is given of the anatomy, physiology, general pathological anatomy, and general pathological physiology of the sympathetic. From page 66, we have the special pathology of the great sympathetic, under which head the author discusses what he chooses to consider to be the diseases of the ganglionic system. The array of maladies is certainly sufficiently formidable. A glance through the book at the page headings gave us at first the idea that we had to deal with a new text-book of general medicine. We were mistaken, however; the author has not quite covered the whole field in his "sympathetic" classification.

The subdivisions of special pathology are six in number, as follows: Diseases of the peripheral ganglionic system, of the cerebral, cervical, thoracic, abdominal, and general sympathetic. A final chapter treats of fever in its relations with the great sympathetic.

Under diseases of the peripheral ganglionic system we have marshalled visceral neuralgias, vaso-motor neuroses, hyperæsthesias of various sympathetic plexuses; sympathetic anæsthesias, paralyses, and cramps; vasomotor paralysis in hemiplegia, scleroderma, hemiglossitis, perforating disease of the foot, zona, the plague, sympathetic ophthalmia, glaucoma, œdema, progressive facial hemiatrophy, local asphyxia, and symmetrical gangrene of the extremities; trophic affections of the muscles, articulations, viscera, and hair; active neuroses or irritations of the ganglionic nerves concerned in the excitation of sweat; and, finally, to round off with, some diffuse ganglionic symptoms.

Diseases of the cerebral sympathetic constitute a modest class of a decidedly tentative character. We are informed that the few lines devoted to them are simply to prevent a gap in classification; precise clinical details are to be a conquest of the science of the future! To this we cordially agree.

Diseases of the cervical sympathetic include exophthalmic goitre, excessive sweating of the face, troubles of the facial circulation, and a timid reference to croup. We might quote the few lines in which he refers to croup, as they serve to show the cheerful willingness of our author to array every pathological process possible under his favourite banner:—

> "The memory remains with us of having read somewhere an opinion, of which we cannot recall exactly either the author or the source, which attributes to the intervention of ganglionic filaments the formation of the plastic products of croupous angina."

The thoracic sympathetic gives us nervous palpitations, spasm of the heart, arterial neuroses, capillary neuroses, spasmodic asthma, and angina pectoris.

Diseases of the abdominal sympathetic are made to embrace active neuroses, or irritations of the ganglionic plexus and nerves of the stomach, and by extension of the œsophagus and pharynx; of the plexus and nerves of the intestines, liver, spleen, pancreas, salivary glands, kidneys, and cœliac plexus, vegetable colic, migraine, peritonitis, nervous ileus or colic, saccharine and non-saccharine diabetes, and Addison's disease.

Strange bedfellows are these, and yet stranger still, perhaps, are those which are brought together under diseases of the general sympathetic: namely, cholera, progressive muscular atrophy, progressive muscular hypertrophy, glosso-labio-laryngeal paralysis, ephidrosis, hæmathidrosis, and chlorosis.

Under the head of fever in its relations with the great sympathetic after some generalities, he treats of a few of the most striking forms of malarial disease.

Under general pathological anatomy he reproduces four plates from the often-quoted work of Lobstein. Three of them represent inflammatory conditions of portions of the sympathetic; the fourth is a representation of the two splanchnic nerves and the solar plexus, on which are seen corpuscles of unknown nature, which have been met with several times post-mortem, in particular in a case of lead colic, and in one of catarrh of the stomach. In regard to these plates we will simply quote our author:—

"Without having a very precise value, they put in evidence the possibility of lesions which we are not in the habit of seeking."

The book is not altogether wanting in entertaining features.

In one of his long quotations from his favourite Poincaré we find the following passage:—

"Le sympathique n'échappe pas au traumatisme, particulièrement dans sa portion cervicale. Le cordon cervical fut blessé par une balle chez un soldat de la guerre de sécession dont l'observation a été publiée par Gunshot."

The reference evidently is to the case mentioned in "Gunshot Wounds and Other Injuries of Nerves," by Mitchell, Morehouse, and Keen. The expression "par Gunshot," is good, and reminds us of some ancient jokes on French translations of English poetry.

We will not go into a lengthy analysis of the contents of the work of Trumet de Fontarce. In our remarks on the essay of Eulenburg and Guttmann we have given the facts of most importance in regard to the physiology and pathology of the sympathetic. Outside of the discussion of the part played by the "great sympathetic" in causation, what has been written or compiled by Trumet de Fontarce about the many diseases considered in his book only has a special interest in cases of affections which are not usually included in the ordinary text-books. We are certainly under obligations to him for having collected into one volume a number of curious and valuable facts about some little known diseases. To a few of these—scleroderma, hemiglossitis, perforating disease of the foot, and local asphyxia and symmetrical gangrene of the extremities—we think it worth while to direct special attention.

In regard to the singular trophic affection of the skin, called scleroderma, Vidal (*L'Union Médicale*, March 11, 1879, p. 404) is chiefly quoted. Two interesting cases are described. In one, a young woman, the trouble began by a local asphyxia of the upper extremities with hyperhidrosis. Gradually the skin of the fingers and of the back of the hand became indurated; the finger ends atrophied. The nose and the cheek also became indurated, the skin pigmented. She experienced pains along the course of the vertebral column, and during several weeks a contracture of cerebral origin held the right arm and the fingers in flexion, a painful contracture, yielding to prolonged extension, as in the contractures of medullary origin. The second case was a man 67 years old, whose first symptoms were coldness and cyanosis of the hands, with excessive sweating of the palmar and plantar surfaces, this local transpiration contrasting strongly with the dryness of the rest of the skin. These symptoms became rapidly more pronounced and others appeared. Under the influence of grief or any emotion, the hands became cold, of a violet hue, their temperature lowering to 27° C. The phenomena gradually extended, gaining the arms, the thighs, and the trunk. They were accompanied by induration and pigmentation. At the time of making the report the scleroderma showed a tendency to become general, and the movements of the neck, of the trunk, and of the thighs were nearly prevented by the rigidity and retraction of the skin.

The pathogenic process, according to Vidal, is as follows: troubles of the vaso-motor nerves, local asphyxia, œdema consecutive to the disorder of circulation, and in the connective tissue chronic swelling, proliferation of fibrous and plastic elements. Vidal believes that the origin of the disease is a lesion of the anterior columns of the spinal cord. He refers to an observation of Chalvet and Luys, who in a case of generalized scleroderma, found sclerosis of the anterior columns of the cord.

Galvanism is advised as a treatment. Trumet de Fontarce refuses to allow the sympathetic to be robbed of the honour of originating this interesting affection, and resolutely attributes both the spinal sclerosis and the hardening of the skin to a vaso-motor disturbance in the domain of the sympathetic. Fouget considers scleroderma a true inflammation of the chorion.

Attention has been recently especially directed to hemiglossitis, or inflammation of one-half of the tongue, by Noel Guéneau de Mussy (*Arch. Gén. de Méd.*, April, 1879). He gives an account of two men, one aged 80, and the other 25 years, who, following a superficial inflammation of the throat and respiratory tract, were attacked with severe glossitis. The left half of the tongue was the chief seat of the swelling, which nearly trebled the volume of the organ. Speech was embarrassed, swallowing painful, salivation abundant, etc. The congestion of the tongue had been preceded during several days by sharp pains in the corresponding side of the head in one case, in the same side of the head and in the ear in the other; and in both these symptoms were accompanied by lancinating pains and hyperæsthesia of the left side of the tongue. The disease is rare. Dechambre and Graves mention several cases. In all of these, as in the two of Guéneau de Mussy, the seat of the affection was the *left* half of the tongue. Guéneau de Mussy believes that the influence of the nervous system can alone explain the phenomena of the disease, as among the anatomical elements of the tongue the nerves only remain independent and distinct in each half of the organ. He refers the morbid action to the sphere of the lingual and chorda tympani nerves. Trumet de Fontarce points to the necessary intervention in such cases of the vaso-motor nerves, and to the implication of the sympathetic through its relations with the chorda tympani nerve and salivary glands.

Perforating disease of the foot (*mal perforant du pied*) is a rare and interesting affection of which a fair account is given. It may be considered, we are told, a trophic alteration connected with a lesion of the vaso-motor nerves of the parts diseased. It has received the attention of Vulpian, and has been particularly studied by Duplay and Morat (*Arch. Gén. de Méd.*, March, April, and May, 1873). In brief, the disease is an ulcerative process which is commonly preceded by the formation of a callosity on the plantar face of the foot. The ulcer is chronic; little by little it gains the deep parts; the articulations and even the bones may be finally invaded, often necessitating partial amputations. Diminution, or even abolition of sensibility at and near the ulceration is usually observed. It is a mixture of anæsthesia proper and analgesia or loss of the pain-sense. The epidermis becomes notably thickened, sometimes over the whole plantar surface. The dorsal surface is sometimes covered with thick scales. In most cases the nails become thickened, yellowish, rough, cracked, and recurved. The skin assumes a brownish colour. The secretion of sweat is generally more abundant and fetid, although, at times, it is diminished or even suppressed. The subcutaneous cellular tissue becomes hardened. Sometimes anchyloses of the articulations of the foot occur, at other times subluxations and deformities are produced. Cutaneous eruptions, inflammatory œdema and swelling, and limited gangrene are among the complications.

Very definite anatomical lesions of the skin, vessels, papillæ, sudoriparous glands, bones, articulations, tendons, muscles, and nerves are produced, and have been studied. The nerves are said to present two distinct lesions: (1) A degeneration of the nerve tubes; and (2) an inflammation of the connective tissue of the nerves.

Duplay and Morat regard degeneration of the nervous elements as the principal cause of the plantar ulceration. They cite two observations, in one of which a perforating ulcer formed after wounding of the sciatic nerve by a ball, and in another the same lesion occurred secondarily from compression of the sciatic at its origin by a cyst of the sacrum. They look upon the spinal ganglia as among the parts capable of determining this vice of nutrition; but they also believe that the ulceration can be caused by certain lesions of the cord. by section or compression of the great nerve trunks, or by alterations of the nerve extremities. According to our author, the ganglionic system ought to occupy a chief role in causation, because of the habitual association of the sympathetic filaments with the divisions of the spinal axis.

Treatment, so far, has been confined simply to attacking symptoms and combating directly the ulceration.

Local asphyxia and symmetrical gangrene of the extremities is an affection to which attention was first specifically called by Maurice Raynaud in 1862. De Fontarce quotes Poincaré and Raynaud. Within the last two years several interesting articles on this subject, but under different titles, have appeared in our American journals. In the issue of this journal for October, 1878, under the title of "Vaso-motor and Trophic Affection of the Fingers," we published a detailed account of a case which represented one of the forms of local asphyxia. Dr. J. Collins Warren (*Boston Medical and Surgical Journal*, January 16, 1879) has published a good paper on "Symmetrical Gangrene of the Extremities," in which the whole subject is well discussed, and all the important references are given.

The disease in one of its most usual forms attacks the extremities of both of the upper or both of the lower limbs; sometimes all four extremities are attacked at the same time. The pulps of the fingers and toes become cold and pale; in later attacks they become of a blue or purplish color; gangrenous patches or abscesses form. Sometimes the ears and nose may be affected, but these parts are not usually attacked with gangrene. Severe pain is often present. The disease is most apt to occur in young women.

Raynaud, Vulpian, Fischer, and others hold that in this affection we have a true spasm of the vessels of the extremities. Raynaud inclines to believe in the spinal origin of the disease. Warren shows very satisfactorily how the affection may be due to a central irritation in the cord, at the point from which the vaso-motors of the regions affected are derived. De Fontarce, however, must, of course, believe that interpretation most legitimate which makes a vice of innervation of the sympathetic to be the cause.

The final chapter on fever in its relations with the great sympathetic, to which we turned with the hope—a faint hope, it is true—of obtaining some new light on one of the greatest of pathological subjects, proved to be sadly disappointing. He throws aside with a simple assertion the theories of heat-producing and heat-regulating centres in the central nervous system. Although so fond of calling upon authority, we find no references here to such investigations as those of Heidenhain on the effect in temperature of irritation of sensitive nerves; of Tcheschichin, on the influence of section of the cord and of the medulla oblongata; of Heidenhain, Dittmar, Owsjannikow, and H. C. Wood, on the existence of a chief vaso-motor centre in the medulla oblongata; of Wood, on the presence in the pons or above it, of a centre whose function it is to inhibit or repress the chemical movements of the body, *i. e.*, the production of animal heat; of

Eulenburg and Landois, and of Hitzig, on the presence in the cerebral cortex of heat-controlling centres.

Jaccoud, Poincaré, Bernard, Vulpian, Mantegazza, and Lobstein, are quoted, but none of those to whom we have just referred.

The views of Trumet de Fontarce on the pathogeny of fever may be summarized as follows:—

The grand sympathetic has the first *rôle* in pathogeny of fever. It can enter into action primarily, or its influence may be exerted secondarily. In the latter case, the nervous system of the animal life is first involved, and transmits the impulse to the ganglionic system by the normal anatomical channels.

Analysis of the facts presented in the two works before us affords no evidence that the sympathetic is independent of the cerebro-spinal axis. No portion of the nervous system is absolutely independent—"all are but parts of one stupendous whole." Bouillaud, quoted by Trumet de Fontarce, speaks of the sympathetic system as holding under its empire all involuntary movements. This may be poetical, but it is not true. The brain alone has imperial sway. The sympathetic ganglia and plexuses doubtless act in some way as local centres of force; but they are not centres in the same sense as psycho-motor areas of the cerebral cortex. They are themselves usually under the control of the cerebro-spinal system. They may by habit acquire a certain amount of automatism, acting sometimes as independent reflex centres.

According to Kesteven the sympathetic ganglia derive their power of action from the cerebro-spinal system by means of the rami communicantes. "It is, however, one of the functions of all nerve corpuscles to cause modifications of the impressions brought to them. The peculiar modification which the nerve corpuscles of the sympathetic cause in the electro-nervous force thus derived from the higher or more specially developed cerebro-spinal system, consists in enabling that force to act upon the involuntary muscular fibres throughout the body" (*Brain*, October, 1878). We quote these remarks from Kesteven, because of their suggestive value. We are not prepared to give adherence to his opinions in regard to vaso-motor centres. He adopts the views of Dr. Radcliffe, which have always had for us a certain charm, that nerve and muscle when at rest are in a state of charge, analogous to that of a Leyden jar. Action is discharge; or, in other words, muscular contractions, and other phenomena accompany a sort of discharge.

The investigations of recent years would seem to show that we have at different levels in the nervous system, different sets of centres concerned with the same functions—centres in the cerebral convolutions, in the pons and medulla oblongata, in the spinal cord, in the sympathetic ganglia, and even perhaps, in the peripheral nerves. Nervous impulses may be, and probably are, transmitted by a species of discharge taking place between these stations.

The peripheral ramifications of the nervous system are so numerous that it is a physical impossibility to have an absolute continuation of its multitudinous filaments through the narrow spinal axis. The posterior spinal ganglia may have for a part of their function the conversion of afferent impressions into such form that they may be transmitted upwards through the cord; while the sympathetic ganglia are concerned in radiating, and, at the same time, harmonizing vaso-motor and other impulses sent down from the brain.

We have no warrant in ascertained facts for any nosological arrangement, such as that of Trumet de Fontarce, which would dogmatically include under diseases of the sympathetic any considerable number of affections. Elaborate classifications into diseases of various divisions of the sympathetic should be discarded. No one, of course, calls in question the fact that the various sympathetic nerve elements may sometimes be attacked by disease. These filaments and ganglia may be the seat of sclerosis or fatty degeneration, may be cut, crushed, or compressed—may, in short, be affected by various pathological processes, as may cerebro-spinal nerves, the cord, or the brain. If experiment and pathological observation have determined that a uniform set of symptoms follows disease or injury of a certain part of the sympathetic, and that these manifestations are not produced by lesions elsewhere, we may speak of these conditions as disorders of the sympathetic without any violation of truth or propriety. The same or similar symptoms, however, are often caused by lesions situated in different parts of the nervous system. Lesions of the sympathetic are also often secondary to disease in other parts. To have a classification founded upon pathological anatomy that shall be of any practical value, we should have fair evidence that the lesions on which the classification is based are primary. For many nervous diseases a good clinical or semeiological classification is, in the present state of our knowledge, the best for the purposes of teaching and practice.

In concluding this review, we desire briefly to call attention to the ablest of recent contributions to the pathology of the sympathetic system of nerves, an elaborate paper by J. M. Da Costa, M.D., and Morris Longstreth, M.D., entitled *Researches on the State of the Ganglionic Centres in Bright's Disease*, in the *American Journal of the Medical Sciences* for July, 1880. These observers give the details of an elaborate study of series of cases arranged in different groups according to the prominence of the changes found. The results of carefully conducted microscopical examinations both of the kidneys and of the renal ganglia are recorded. We will not go into an analysis of the paper, deeming it unnecessary, as it appeared in the last number of this Journal. Their conclusions were as follows:—

> "1st. That in Bright's disease, especially in the contracting kidney, there exists a constant lesion of the renal plexus.
>
> "2d. That, whilst this lesion might be looked upon as forming part of a general process of degeneration in connection with the kidney disease, we think it is the cause of the renal malady and precedes the degenerative changes.
>
> "3d. That the diseased condition of the ganglia furnishes the clue to the alterations of the vessels of the kidneys.
>
> "4th. That similar changes producing similar results may exist in other ganglia, for instance, in the cardiac plexus, explaining the hypertrophy of the heart."

Believing as we do in the inter-communication and inter-dependence of the cerebro-spinal and ganglionic "systems," the question of the causative relations of lesions of the sympathetic ganglia to disease of the kidneys or other organs cannot, we think, be positively decided without an investigation, in the cases studied, of the rami communicantes and spinal cord, and, perhaps, also of the brain. Nevertheless, the research of Drs. Da Costa and Longstreth is an original and valuable contribution to pathology.

C. K. M.

ART. XIX.—*St. Bartholomew's Hospital Reports.* Edited by W. S. CHURCH, M.D., and ALFRED WILLETT, F.R.C.S. Vol. XV., pp. xlviii., 330. London: Smith, Elder & Co., 1879.

As is our custom we shall notice the medical and surgical papers in the volume separately, beginning with those of special interest to the physician.

In the first of these, Dr. J. MATTHEWS DUNCAN reports *Two Cases of Nerve Lesion in Gynæcology*, which are illustrations of remote symptoms in diseases of unimpregnated females. In one, the patient, after suffering for some time from menorrhagia, began to complain of constant pain from the left hip to the knee, and of involuntary contractions of the muscles of the left thigh, which produced distressing twitchings of the limb, and interfered most injuriously with sleep. Upon examination the cervix uteri was found to be much enlarged and nodose. The whole uterine mass felt as if displaced to the left, and adherent or fixed to the plane of the left ischium. The right side of the pelvis presented natural conditions. In the region of the left great sciatic notch a dense cancerous induration could be felt by the finger. The author attributed the pain and choreic movements of the thigh to malignant degeneration of the nervous trunks before they leave the pelvis.

The patient in the other case had had a very difficult labour, in which forceps were used. Afterwards, she had aching pain in the womb, and, at the time she came under Dr. Duncan's care, was unable to walk, in consequence of pain in the sole of the left foot. Digital examination discovered a long cicatrix running along the left side of the vagina from the cervix uteri to near the os vaginæ. On the right side of the vagina was a similar cicatrix, only shorter. The foot presented to the eye a perfectly natural appearance, but was the seat of intense shooting pains. Gentle touching any part of the sole produced no pain, but firm pressure, affecting parts deeper than the skin, was very painful. Pressure on the posterior tibial nerve below the knee and behind the ankle elicited pain in the pressed parts. These symptoms, which came on about six weeks after her confinement, the author attributes to inflammation of the posterior tibial nerve. The right foot would appear to have been at one time similarly affected, but was not complained of at the time of her admission. She was kept in bed, and treated with a liberal diet and tonics (iron and arsenic); the foot was also frequently fomented with hot water. Improvement gradually occurred, and in seventeen days she was nearly well.

Dr. REGINALD SOUTHEY'S paper *On the Treatment of Acute Rheumatism by Salicylate of Soda* is a continuation of his article in the previous volume entitled *Observations on Acute Rheumatism*, which was fully noticed in the April number of this Journal for 1879, and to which we must therefore refer those of our readers who are not familiar with the author's views as to the pathology and nature of the disease. His results with the salicylate do not seem to have been better than those he has obtained with other remedies. Indeed, as good can be obtained, he says, without any medicinal treatment, if the patient be put to bed and properly nursed. In his opinion, therefore, neither is the duration of an attack of acute rheumatism shortened, nor is the tendency to heart complications diminished by its use. It would seem also to be without power to modify an attack of endocarditis already existing at the time of its administration. In support of his opinion, he cites a case in which the patient had a relapse, while still taking the remedy, eleven days after the subsidence of all the symptoms and the return of the normal temperature.

Dr. DYCE DUCKWORTH's *Clinical Contributions to Practical Medicine* contain the reports of several interesting cases as well as valuable suggestions as to the treatment of disease. Thus, in the treatment of the acneiform rash, which is so apt to arise during the administration of the bromide of potassium, he recommends a wash composed of two drachms of precipitated sulphur, one drachm of tincture of camphor, and two ounces of lime water,—an application, the virtues of which we have recently tested with very satisfactory results in a case at present under our care. Glycerin, from its soaking properties, he has found to be a very valuable addition to poultices in the hard and painful stages of furuncular inflammation. It is also a source of much relief and benefit when applied by means of a camel's-hair brush to the "blind boils" which are so frequent about the nostrils, in situations where poultices cannot be applied, and which generally give rise to a great deal of discomfort. The free use of glycerin and borax also seems to answer best, in his experience, in the treatment of aphthous stomatitis.

In one of his communications the author calls attention to a *Peculiar Ulcerative form of Gingivitis met with in Cases of Congenital Disease of the Heart.* In the cases which have come under his observation the ulceration has commonly occupied the lower gums, about the incisor teeth. In one case, which he describes in detail,

> "there was loss of substance, and the teeth were a good deal exposed. The surface was very red, raw, and fungus looking; it bled readily. Shreddy, sloughing particles were more or less adherent to it. It was painful during mastication. There was no general sponginess of the gums, and no other form of stomatitis present."

The case proved rebellious to several methods of treatment, but at length gradually improved under the use of borax and chlorate of potash. The author regards this ulceration as so characteristic that he has been led by its presence to seek for evidences of cardiac defect.

Among the cases reported by Dr. Duckworth is one of *Anæmic Dilatation of the Heart*, in which the transverse percussion dulness measured at one time four and three-quarter inches. The chief symptoms complained of were dyspnœa and pain under the mammæ. Palpitation, although so common a symptom in anæmia, appears not to have been present. The physical signs were as follows: The apex of the heart was in the sixth left intercostal space, one inch outside the nipple line. At the apex, on auscultation, the first sound was found prolonged, rather toneless and reduplicated. Soft souffle with systole at the base louder along the pulmonary artery. A loud *bruit de diable* was of course also heard in the jugular veins. Under the influence of rest and suitable treatment, the transverse dulness had diminished to one and three-quarter inches at the time of the patient's leaving the hospital. An accompanying diagram shows very satisfactorily the gradual diminution of the cardiac dulness.

In regard to *The Prognostic Value of Herpes Labialis in Pneumonia*, the author expresses himself as follows: "So far as the presence of herpes is of any moment in a given case of acute pneumonia, it may fairly be taken, on the whole, as of decidedly favourable import, and, along with other signs, may serve as an element of some value in forming a prognosis."

Charcot was the first, we believe, to call attention to *The Occurrence of*

Sweating in Cases of Paralysis Agitans, but Dr. Duckworth claims to have made this observation independently as long ago as 1866, or before the publication of the "Leçons sur les Maladies du Système Nerveux," and in support of this claim cites several cases. In the last communication of the series he discusses the *Aspiration of Hydatid Cysts*, a method of treatment which he condemns because the canula is so likely to become choked. A much more satisfactory result is, in his opinion, generally obtained from the graver operation of free opening and evacuation of the contents of the cyst.

In a paper *On Fur on the Tongue*, Mr. HENRY T. BUTLIN, after passing in review the opinions of Piorry, Pfeufer, Miquel, Neidhardt, Hyde-Salter, Kölliker, and others, on this subject, says that his observations have convinced him that it is composed, in health and disease, chiefly of minute living organisms (schistomycetes) and not as is generally supposed of cast-off epithelium, although this is always, and the debris of food generally, detected in it. The organisms of which fur consists may, he says, enter the mouth with the inspired air or with solid or liquid food. Once arrived in the mouth, it is difficult to imagine a better nidus than the surface of the tongue affords for their support and development. During the day the tongue in health is continually cleansed by being rubbed against the roof of the mouth and against the gums and teeth. During the night, on the contrary, the cleansing of the tongue is not nearly so efficiently carried on; early in the morning, therefore, the coating of fur is thicker than at any other time of day. The fur is always thickest at the centre and back part of the tongue, which are precisely the parts which are least movable and hence most difficult to cleanse. He regards cases of unilateral furring as peculiarly illustrative of the laws of furring. In two cases, which came under his observation, the left half of the tongue was coated three or four times as thickly as the right, the difference being due in each case to the fact that the left upper jaw had been removed only a few weeks previously, so that most of the cleansing apparatus was absent from that side.

Mr. Butlin explains the occurrence of furring of the tongue after a heavy meal or an excess in wine, as follows: Under these circumstances, he says, the breathing is oppressed, and the mouth is generally kept open. This favours the access of the parasite to the tongue, which becomes dryer than usual, but not generally so dry that the development of the fungus is interfered with. The movements of the tongue are consequently less active—a condition which favours the accumulation of fur.

Unfortunately, the examination of the fur on the tongue will afford us no aid in diagnosis, since the author has not been able to discover that any one of the organisms he has described, as occurring in the fur, is constantly met with in any disease. Certain forms, it is true, are more commonly seen in certain diseases than in others, but not with sufficient frequency to justify us in relying upon their presence or absence in coming to a conclusion, as to the nature of the disease we have to deal with.

Dr. NORMAN MOORE reports *A Case of Sclerosis of the Cerebral Cortex, with two other Examples of Cerebral Diseases in Children.* The patient in the case of sclerosis was a little girl of five, who up to the beginning of her fatal illness had apparently always enjoyed robust health. It is particularly mentioned that she had never had either fits or a discharge from her ears or nose. She had also inherited no predisposition to disease. The chief symptoms observed during life were disturbances of the motor system, first on the left side, and later on both sides, convulsions and speechlessness, while the chief appearances after death were sclerotic changes different in degree, but most complete in the fronto-parietal, frontal, and occipital region. The other examples of cerebral disease referred to in the title do not seem to have presented any unusual symptoms.

In the course of some *Remarks on Angina Pectoris*, Dr. V. D. HARRIS takes occasion to say that there are two distinct conditions usually classed under this head. In the first the attack of pain is severe and accompanied by dyspnœa, by the sense of suffocation or of impending death, and generally by some alteration in the pulse. In the second, the pain is less severe but more erratic, is less often accompanied by dyspnœa and alteration in the pulse and is less dangerous, but is of more frequent occurrence. The first variety has been, in the cases which have come under his observation, nearly always associated with valvular disease, and most frequently with aortic incompetence, whether produced by rupture, atheroma, or in any other way. The second variety, on the other hand, is seldom associated with valvular disease, but rather accompanies dyspepsia and kindred disorders, but may be complicated by a weak heart. Thus, in eighty heart cases, which were under his care in 1878, angina pectoris had occurred in two only, and these were both cases of aortic obstruction and incompetence. The examination of the statistical tables of the hospital for the last seven years give a very similar result, for out of six hundred and seventy-three cases of heart disease, he could find but ten cases of angina pectoris, and nearly, if not quite, all of these were connected with disease of the aortic valves. In conclusion, the author says that, while the exact pathology of neither condition has been made out, there are some reasons for believing that "both varieties are closely connected with gout, and occasionally with rheumatism."

Dr. DYCE DUCKWORTH, in his *Studies of some Irregular Manifestations of Gout*, shows under what protean forms this disease may show itself. Among these may be specially mentioned vicarious menstruation, chronic metritis, nodose small joints, chronic desquamative erythema of the cheeks and nose, headache, insomnia, irritability of temper or depression of spirits, wandering pains, deep-seated pain in the heel or sole, cramps, and so on.

The author describes a gouty throat :—

> "The pillars of the fauces, especially the posterior pair, the velum, and the uvula, are," he says, "very red and glazed. They appear as if freshly brushed over with glycerine, some dilated veinules may often be seen coursing over parts of the membrane. The uvula is greatly enlarged and elongated, sometimes seeming to fill up the gap between the pillars. It has often an œdematous border, or edging and tip. Sometimes it is so big that the condition of the pharynx can hardly be observed. The surface of the latter is not so smooth as that of the fauces. It is coarse, with red, glairy prominences upon it, and depressions here and there covered with grayish, slightly adherent patches of mucus, and it has sometimes enlarged veinules upon it."

The condition of the nails he thinks also worthy of attention. They have been noticed, he says, to be in the subjects of irregular gout particularly brittle, and to present linear markings in their long axes. He admits, however, that this appearance of the nails is occasionally seen in cases in which no gouty history or proclivity can be made out. Diabetes in elderly people is also often nothing more than a manifestation of gout, a fact which may possibly explain its being a less fatal disease in this class of patients than in the very young.

One of the most thoughtful and instructive papers in the volume is that by Dr. T. LAUDER BRUNTON, *On the Pathology of Night Sweating in Phthisis and the Mode of Action of Strychnia and other remedies in it.* After a brief reference to the situation of the sweat centres, which the author believes are localized neither in the medulla oblongata nor in the spinal cord, but that they extend through both, he expresses his conviction founded upon observation and experiment that the cause of the sweating in phthisis is the accumulation of carbonic acid in the blood. "I have watched," he says, "the process, and have observed that it was just as the finger-nails, the lobes of the ear, and the lips began to get livid that the sweat drops began to appear on the forehead." The imperfect aëration of the blood would lead also to imperfect oxidation of the products of tissue-waste in the body, and their consequent accumulation would produce the soreness of the muscles and the lassitude which generally follow a night sweat, and which are frequently attributed to exhaustion from it; an explanation which is eminently unsatisfactory since the amount of nutritive matter contained in the sweat is very small, and the actual loss of material from the body in perspiration must be insignificant.

The author answers his own question: "How is it that carbonic acid comes to accumulate in blood?" as follows:—

> "In a healthy person no such accumulation takes place, because, although carbonic acid in the blood acts as a stimulus to the sweat-centres, the vaso-motor centres, and the respiratory centres, yet the latter are more susceptible than the two former, so that whenever a slight increase of the amount of carbonic acid in the blood occurs, the respiratory centre is stimulated, the respiratory muscles are thrown into increased action, and the blood being more aërated, the amount of carbonic acid in it is once again reduced to the normal. But supposing the respiratory centre is weakened in any way so as to become less sensitive to the stimulus of carbonic acid in the blood than in the other two centres, this will no longer be the case, and then we shall find cold perspirations occur. This is the condition which I believe to be present in phthisis. The constant stimulation of the respiratory centre by the irritation in the lungs, and the violent respiratory efforts which occur in coughing, so exhaust the irritability of this centre, especially during sleep, that it no longer responds in the normal manner to the stimulus of carbonic acid in the blood. The blood may thus become more and more venous, until the carbonic acid in it excites the sweat-centres, and possibly also the vaso-motor centres, before the respiratory centre begins to respond."

It occurred, therefore, to Dr. Brunton that night-sweating might be prevented by administering some remedy which would increase the excitability of the respiratory centre, and with this end in view has been experimenting with strychnia and nux vomica, which have been shown by Prokop Rokitanski to possess this power. In four cases in which he gave the tincture of nux vomica at bedtime, it seemed to him to exercise a controlling influence over the sweating, which had previously to its use been a very annoying symptom. It was found also to have a tendency to increase the cough, probably from rendering the respiratory centres more susceptible to reflex irritation. This disadvantage he was, however, able to overcome by combining the remedy with opium.

The author regards atropia as a valuable remedy in the treatment of sweating, more valuable indeed than strychnia, which he only recommends when the former, for some cause, cannot be given. For in addition to its properties of stimulating the respiratory centres, and of paralyzing the peripheral terminations of the secretory nerves in the sweat glands, it lessens the irritability of the sensory nerves and the lungs, and is thus likely to diminish the exhaustion of the respiratory centre, which the reflex irritation produced by tubercle would otherwise occasion. He says also that in Dover's powder, which we believe was originally recommended by Dr. Stokes in the treatment of night-sweats, we have a combination having an action somewhat resembling that of atropia in certain respects, though differing from it very markedly in others. For the opium, by lessening the irritation from cough, will tend to prevent the exhaustion of the respiratory centre, while ipecacuanha, being a powerful stimulant to this centre, will tend to increase its activity. Picrotoxine, also, has been found to be useful in night-sweating—a property which it probably owes to its stimulating action upon the respiratory centres.

A short communication from Mr. R. HAROLD A. SCHOFIELD contains an account of some *Observations on the Secretion of Saliva in a Case of Parotid Fistula*, which was placed at his disposal for purposes of experimentation. In the course of these observations he found that the flow of saliva, produced by sugar, was more copious and lasted longer than that excited by salt, pepper, dry bread, water, milk, or lemonade. Salt, however, was found to be the most rapid in its action of all these substances, the flow of saliva, beginning within five seconds after it had been taken into the mouth; dilute hydrochloric acid, dilute acetic acid, oil of peppermint, oil of spearmint, and oil of cajeput all excited a flow of saliva generally within from five to seven seconds after being dropped upon the tongue. Ether and chloroform by inhalation also produced salivation; that by the former being more copious and lasting longer than that caused by the latter. The excretion of iodide of potassium through the salivary glands was also proved to precede its elimination through the kidney.

When the chest is smartly percussed over the pectoralis major muscle, with the tips of the fingers, small tumours are often observed to develop at the points of percussion. To this the name of *Myoidema* has been recently given by Dr. Lawson Tait, who asserts that it is not only pathognomonic of phthisis, but also that it varies in amount directly with the activity of the destructive disease in the lung. In order to determine whether any relation exists between it and phthisis, Dr. SAMUEL WEST undertook a series of investigations, the results of which are given in a short communication. In 245 cases, 165 of which were surgical, and 80 medical, taken at random in the wards of the hospital, this symptom was found to be present in 82, but it was twice as common in the medical as in the surgical wards, occurring 45 times in the former, and only 38 times in the latter. It was observed in a great variety of diseases, and by no means exclusively in phthisis. For of the 38 surgical cases in which it was present, 4 only were phthisical, and out of the 45 medical cases only 13 had any affection of the chest at all, and of these 4 were certainly not phthisical. Mr. West hence concludes that myoidema is due

> "apart from mere thinness which is so important for its production, to an over-excitability of the muscles or its nerves, and it may be either physiological or, as is more usual, evidence of some nutritive disturbance in the muscle itself, and this may depend on local disease of the muscle tissue, or be part of some general impairment of nutrition."

Myoidema must not be confounded with the fascicular contraction which is sometimes observed when the chest is percussed, and which is entirely distinct from it. The two forms of contraction are occasionally, but by no means always, associated.

The patient in Mr. STEAVENSON'S *Case of Lepra Anæsthetica* was born in Persia, but, with the exception of a very few years, which were spent in England and Abyssinia, had passed his life in India. His mother is said to be a sufferer from elephantiasis, but none of his family, to his knowledge, ever had leprosy. In the part of India, in which he had lived, salt fish forms a large part of the diet of the people; but it does not appear from the history whether he had been accustomed to eat freely of it or not. It is, therefore, not possible to ascribe the disease in his case to this cause with any certainty. A noticeable feature of the case was the want of proportion between the paralysis and the atrophy of the muscles, the former being greatly in excess of the latter. The patient was treated at first with the Gurjun balsam as recommended by Dr. Duckworth in the "St. Bartholomew's Hospital Reports" for 1874, but not with the same satisfactory results. In fact no improvement seems to have followed the administration of any medicine. Faradization would seem, however, to have been of some service.

A second contribution by Mr. W. E. STEAVENSON is entitled *An Unusual Cause of Hemiplegia.* The history of the case is briefly as follows: While larking the patient attempted to kiss a fellow servant, and approaching his face to hers a knitting-needle, which was placed behind her left ear, entered his left orbit, passing between the bone and the eyeball, to the depth it is said of four inches, and no doubt entering the brain. From the symptoms which followed the injury, and from some experiments which Mr. Steavenson made on the dead body, he has little doubt but that the needle passed through the sphenoidal fissure and injured the brain somewhere in the neighbourhood of the third left frontal convolution, or what is called Broca's convolution. The injury at the time caused the patient intense pain but did not injure his sight. Paralysis did not occur until the fifth day, when he lost all power over his right upper extremity, side, and leg. He also lost the power of speech, but this returned at the end of two months. Later epileptiform convulsions occurred. When he came under Mr. Steavenson's care the muscles of the right side were paralyzed but rigid. Little or no improvement in his condition resulted from the treatment which was employed during his stay in the hospital.

In his *Note on the History of the Doctrine of the Circulation of the Bile* Dr. J. WICKHAM LEGG contends that views on this function very similar to those announced about ten years since by Schiff were held by certain physiologists nearly one hundred and fifty years ago, and in support of his position quotes a passage from Bianchi.

The volume concludes with the usual statistical tables by the medical and surgical registrars. J. H. H.

The first of the surgical papers is one that lays strong claims to our attention, both from its subject and its author. It is a short but most graceful tribute to the memory of GEORGE WILLIAM CALLENDER, by Sir James Paget, F.R.S.; a biographical notice of one whom so many Americans had of late years learned to regard as a friend. The comparatively brief, though successful, career of Mr. Callender is sketched with the masterly simplicity of style and the faultless diction which characterize whatever comes from the pen of Sir James Paget.

An Account of an Unsuccessful Attempt to Treat Extroversion of the Bladder narrates the experience of Mr. THOMAS SMITH in endeavouring to relieve this most distressing of human ills, by attaching the ureters to the colon, as has been once done, with partial success, by Mr. Simon. Only one ureter was operated upon at a time. The patient was a boy eight years old. A fine catheter was inserted into and through the left ureter, until it was presumed to have reached the pelvis of the kidney. Lumbar colotomy was then performed, and the ureter being easily found by the catheter within it, was divided, as far from the kidney as practicable. The proximal end of the ureter was then inserted into a small opening made into the colon, and was made to project for half an inch into the lumen of the bowel, being secured in position by fine catgut stitches. For six days urine passed freely by the rectum, but after that time a fecal fistula became established in the loin, through which also urine passed freely; suppuration now took place around the kidney, and several abscesses successively discharged through the fistulous opening. After eight months the fistula was closed by operation. At that time it could not be told whether any urine passed by the bowel, but none came from the exposed left ureter, and the adjacent mucous membrane of the bladder had become very nearly cutaneous in character.

Fourteen months after the first operation a second one was undertaken and successfully accomplished upon the right ureter. Suppression of urine ensued and death relieved the patient in fifty hours. Upon post-mortem examination the left ureter was found terminating on the back of the descending colon, but no connection between its lumen and that of the gut could be made out. All true renal structure had disappeared, the pelvis of the kidney being distended by what appeared to be urine. Upon the right side was found a much enlarged and inflamed kidney. Urine distended the pelvis and ureter. The latter was attached by five sutures to the back of the colon, and a probe could be passed from one to the other with some difficulty.

Although in the first operation a communication between the ureter and the bowel was established for some time, and no injurious absorption of urine from the mucous membrane took place, yet in view of the fact that the effect upon the kidneys was so disastrous Mr. Smith thinks there is no encouragement to repeat the operation. He also thinks that the passage of wind from the colon into the pelvis of the kidney is a very probable source of dangerous disturbance to the integrity of the latter organ.

Notes on Hospital Practice, by the late G. W. CALLENDER, F.R.S., and Mr. G. W. GABB, possesses a melancholy interest as the last contribution to the science he loved, of one of its lamented authors. Although deprived of the advantage of Mr. Callender's final revision and comments, the paper is of much intrinsic value as the concluding article on methods of hospital practice in the series which its principal author has contributed to successive volumes of these Reports.

The paper is based upon two hundred and sixty-five operations done in the theatre of the hospital during the years 1876, 1877, and 1878, with a mortality of 3.7. Besides these there were four cases of tracheotomy, of which two were fatal, three of trephining, of which two were fatal, and sixteen cases of herniotomy, of which six died. Of these last we are told, that in the fatal cases the sac was opened four times, and in the successful ones seven times, while among the recoveries was one woman eighty-eight years old. In addition to these there were many minor operations done in the wards and not recorded.

By another table we learn that during the three years mentioned five hundred and two accidents came under Mr. Callender's care, with a mortality of 5.6. Of course these figures do not convey any accurate knowledge, but upon glancing over the character of the cases it will be seen that there was the usual proportion of severe ones among them. It is therefore evident that the rate of mortality was low.

Mr. Gabb narrates several cases which are of interest from the peculiarities they presented, but our limits will not allow of noticing more than one among them. In this case a stab had been inflicted at the edge of the cheek, passing downwards. To get at the point of the hemorrhage which ensued required a dissection, when the internal jugular vein was found to have an opening in it the size of a pin's head. This hole was picked up and tied with catgut, and the man made a good recovery.

Mr. Callender employed the same dressing with carbolized oil and drainage tubes, which he has before advocated, and which has been so fully dwelt upon by Dr. Markoe in the number of this Journal for January, 1880. It is also noticeable that it was the custom to give hypodermic injections of morphia freely for the first two or three days after any operation, care being first taken to ascertain that the condition of the kidneys did not contraindicate the use of opium. We have been long convinced of the great value of opium after operations, but it is of the utmost importance that the state of the kidneys should be known before resorting to it, otherwise the surgeon, who very properly relies upon its aid, may, when an albuminuric patient falls into his hands, find himself confronted by most serious and even fatal symptoms. The exemption from erysipelas and pyæmia, which Mr. Callender claimed to characterize his wards in the last volume of Reports, seems to have continued, and we are told that no cases of the former and but one of the latter occurred within them, and that the one instance of pyæmia which did arise was in the person of a man with depraved and vitiated constitution, where the wound never became healthy.

W. MORANT BAKER writes of *Aneurisms which do not pulsate*, and narrates three cases; one of which was popliteal and two subclavian. We cannot follow Mr. Baker through his close and interesting study of the first of these cases. Few judicious surgeons will be inclined to dispute his conclusion that "the absence of pulsation is not to be regarded as incompatible with the existence of an aneurism." It is a fact which should never be lost sight of, and one which has been observed with sufficient frequency to make an error of diagnosis on this account inexcusable.

On the Osseous Tumours of Bone, formerly called Osteoid Cancer, is the title of an article by W. J. WALSHAM. Its object is to maintain that true carcinomata may arise without an epithelial starting point, and the histories of two cases are given which appear to sustain the position, at least they were cases of carcinoma in which no epithelial disease was recognized during life. In holding this view Mr. Walsham is opposed to some of the most eminent pathologists, especially among the Germans, and indeed the question seems to be given up by most modern writers upon the subject. The two cases upon which Mr. Walsham depends were under observation in the wards of St. Bartholomew's, for a considerable period of time, and there was nothing whatever in their symptoms to point to primary epithelial disease, but there was no search made for it in the mucous tracts after death; had such a search been made the cases would be more conclusive. Whether these tumours which occur in connection with the bones, are sarcomata, chondromata, or carcinomata seems to make little difference to either patient or surgeon, as the results are equally fatal.

Mr. F. S. Eve contributes a paper *On Necrosis at the Extremity of the Diaphyses and in the Epiphyses of Growing Bone*, in which several cases are narrated, and the question is raised as to why it should be so common an occurrence in such situations in the young.

R. Harold A. Schofield, M.B., gives his experience of military surgery in an article entitled *Surgical and Medical Notes during the wars in Turkey*, 1876–77. Mr. Schofield's experience seems to have given him a more favourable impression of the organization of the Servian and Turkish hospital departments than is shared by many who have written upon the subject, at least the lines fell to him in more pleasant places, for he does not appear to have witnessed the distressing scenes which fell under the eyes of those whose duty called them nearer the front, where lack of organization is always most apparent, and where the most perfect is pretty sure to break down under the mortal stress of events. The surgical information is meagre and necessarily cursory. Reference is made to the existence of a sect in Russia, numbering thousands, whose peculiarity is to remove from its members both penis and testicles. How the operation is performed we are not told, nor how the hemorrhage is restrained, as it has never been witnessed by medical observers.

The same author contributes *Observations on the Secretion of the Saliva in a case of Parotid Fistula*, which deal with the rapidity and continuance of the flow of the salivary fluid as excited by some of the ordinary articles of food, and certain medicines.

Mr. C. B. Lockwood, in an article on the *Measurements of the Male Urethra*, shows that the circumference of the penis bears a pretty constant proportion to the size of the urethra, and recommends the adoption of the scale of French instrument makers instead of that in use in England, as giving a more regular gradation.

In a paper *On the Treatment of Varicose Veins by Abscission of Portions of the Affected Veins*, Mr. Hugh Percy Dunn advocates the removal of several small pieces of the dilated vessels, without the use of ligatures, and by the antiseptic method. The practice of interfering with varicose veins by operation has increased very much of late under the safeguards thrown around the measure by the Listerian method, and Mr. Dunn thinks experience has shown its safety. The same teacher has shown him that all risk of hemorrhage can be easily averted by the use of proper pads. The ultimate results attending this or any other operation upon dilated veins, and the question as to the permanence of the cure effected is not discussed by Mr. Dunn, while it is the principal one upon which the merit of the measure must be decided.

Clinical Notes of some Cases in Mr. Savory's wards, by W. Bruce-Clarke, M.B., contains very brief references to cases of quite distinct and varied character. Among them we notice one of pyæmia, following amputation of the thigh performed with full antiseptic precautions, and one in which the same condition followed vaccination, in a child fourteen weeks old.

The most interesting among these cases is one where gastrostomy was performed by Mr. Langton for the relief of compression of the œsophagus by cancerous glands in the posterior mediastinum. When the operation was decided upon, an incision was made down to the stomach, and that viscus was attached to the abdominal walls by silver sutures. Nine days later, when it was hoped union had taken place between the stomach and the lips of the abdominal incision, the former was opened. The patient survived this last step three days, being nourished partly by the stomach, and partly by enemata. At the autopsy there was found to be no other connection between the stomach and the abdominal walls than that afforded by the silver sutures.

Several other of these cases are possessed of interest, but they are presented in too condensed a form to admit of abstraction.

The Anatomy of the Chiasma of the Optic Nerves is discussed by C. W. M. Moullin, M.B., in a short paper which possesses interest only for the anatomist, and which can only be understood with the aid of illustrations.

The only other surgical papers are short notes scattered through the record of the proceedings of the Abernethian Society, and the elaborate and very complete statistical tables.

One surgeon, Mr. Thomas Smith, and one assistant surgeon, Mr. Morant Baker, are the only members of the surgical staff who have contributed to this volume, or made any effort to add to its value, the places which should be filled by them being occupied largely by very young writers. In consequence this number of the Reports does not present such a record of hospital work as should emanate from this old and honoured hospital. S. A.

Art. XX.—*De l'utilité des Lavages intra-utérins Antiseptiques dans l'infection puerpérale.* Par Joanny Rendu (de Lyon), D.M.P., Ex-interne, Lauréat de l'École de Médicine, Prix Monthyon (1877), Médaille d'argent de l'Académie de Médecine, Lauréat de l'Institut (Prix Bréant). Paris, 8vo. pp. 113.

On the Usefulness of Washing out the Womb with Antiseptics, in Puerperal Infection. By Joanny Rendu, M.D.

This monograph is one of considerable importance, on account of the subject, on account of the author, whose titles show him to be one of the most prominent of the younger members of our profession, and on account of the amount of evidence brought forward in proof of the great value of the means therein advocated of contending with one of the most deadly, and distressing diseases physicians are called upon to meet. As one of the most eminent living authorities has recently said, "There is no subject which excites more the interested attention of the profession and of the public than puerperal deaths; yet, unfortunately, there is none regarding which there is more misunderstanding."[1] Septic diseases, septicæmia, and pyæmia are by far the most prevalent and important causes of puerperal deaths, and it is, we firmly believe, to antiseptic methods that we are to look with the best prospect of preventing suffering and of saving life. The author of the well-written and well-argued work before us maintains that a most effectual method is that of washing out the womb when the lochial discharge has a bad odour.

Dr. Rendu has divided his work into six chapters. The first contains the history of intra-uterine injections, in the special point of view interesting us; in the second and third, uterine injections are affirmed to be rational and innocent; in the fourth, the method is shown to be efficacious;

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[1] See J. Matthews Duncan's "Remarks on Antiseptic Midwifery," British Medical Journal for Feb. 15 and 22, 1879.

in the fifth is given the present opinion of accoucheurs on this question; and in the last, are given the conclusions, the indications, for this treatment, and the way of carrying it out.

In the chapter on the history of uterine injections, Dr. Rendu proves conclusively that neither Ambrose Paré, nor Moriceau, nor Dionis practised them. We must come to the middle of the eighteenth century before we can be sure that they were practised. In 1757 Recolin presented a memoir to the Royal Academy of Surgery, in which he shows the happy effects he has had from intra-uterine injections (*Mem. de l'Acad. Royale*, t. iii. p. 202). We may remark here that Thomas (A Practical Treatise on the Diseases of Women), after stating his indebtedness to others, tells us that Hippocrates advised intra-uterine injections, Paul of Ægina, etc. etc. Hippocrates says (Littré's Ed : vol. vii. p. 344), when after a delivery the womb (αἱ μῆτραι) inflames, inject the parts of generation (τὰ αἰδοια). Paul of Ægina (Ed. Syd. Soc., vol ii. p. 392), advises, when the putrid smell of retained placenta affects the head and disorders the stomach the use of suitable fumigations. In Galen and in Antyllus there are, however, passages that would seem to signify that injections were thrown into the *womb*.

It is, theoretically, very easy to show that puerperal traumatism is altogether like to general traumatism, and that in both cases the wounded surface acts in the same way in the contact of septic matters. By washing away putrid matters capable of infecting the system, we fulfil a rational indication, but we cannot believe it can be done *safely* in the one case, while it certainly can in others. When we wash away the offensive clots, and strips of gangrenous tissue from an amputated limb, or excised breast, we run no risk of throwing the fluid into the cavity of the peritoneum.

Dr. Rendu tries to prove these injections to be safe, by proving the theoretical objections to them to be unfounded, and by clinical observations in which no inconvenience resulted to patients.

Some twenty-seven years ago we saw a case in the wards of M. Nélaton, in the Hopital des Cliniques, which we have related elsewhere, as follows :[1]

April, 1853. A German woman entered the wards, who had a fibrous polypus in the vagina, attached by a pedicle to the interior of the uterus. The tumour was removed by excision, and everything went on very well until the end of the fourth day, when she complained of restlessness, and a tenderness in the lower part of the abdomen. A tumour was found to have formed there, in which was detected, not the raising of an abscess, but the wave of liquid effusion ; this wave was limited to a very small extent of the abdominal walls. The general symptoms were those of peritonitis, and not of a phlegmon; moreover, the collection had formed too rapidly to be an abscess.

These cases give rise, sometimes, to very great mistakes of diagnosis; the circumscribed peritonitis can give rise to a swelling, and to symptoms imitating retention of urine. M. Nélaton has seen a number of such cases; sometimes the collection of liquid is in the recto-vaginal cul-de-sac. In one case he related, he had supposed the collection to be purulent rather than serous; and to show how a surgeon can lose his presence of mind at an operation, although the trocar was introduced behind the vagina, when the interne saw the clear liquid come out, he cried out that the bladder had been opened.

In this case blisters were applied over the seat of the affection, as the best of all applications in serous effusions. The symptoms, however, became aggravated, the tumour displaced itself a little toward the left iliac fossa, and commenced to show signs of being something more than a mere serous effusion; a trocar was introduced, and a large quantity of pus was drawn away. The patient died.

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[1] See Clinical Lectures on Surgery, by M. Nélaton, page 703.

At the examination, the liquid was found to have been effused in a portion of the peritoneal cavity circumscribed by adherences. The uterus and vagina opened by their posterior face the point of insertion of the polypus was shown and its excision seen to have been as complete as possible. The operation had been as simple as possible, and yet it had given rise to fatal accidents; for it was not to be dissembled, that the excision had been the cause of death.

How such a case produces such effects is disputed. Some maintain that it is by a violence done to the large ligaments, that gives rise to an inflammation, but this is not true, for if so, the disease would commnence at once. M. Nélaton believes the inflammation of the peritoneum to be owing to the contact of a small quantity of pus, that, formed in the uterus, passes there through the Fallopian tubes: in this case in fact, by pressing the tubes, pus was made to come out.

This pus may be formed in the uterus as said, or, what is more probable, the inflammation developed in the uterus by continuity of tissue, travels along the tubes to the peritoneum.

These are not the only cases that give rise to this opinion, for M. Nélaton has also seen the symptoms, after injections made into the cavity of the uterus, the liquid going through the tubes. By introducing a catheter into the uterus of a dead woman and pushing in a liquid, the water can be seen to issue from the Fallopian tubes, and the tissues of the dead body are more hard and rigid than those of the living. Again, cases occur perfectly inexplicable, unless it be acknowledged that there is a passage along the tube; as those taking place after a gentle exploration of the polypus with the finger. In one case of his own in which death had ensued soon after an examination with the finger, the polypus was found to close completely the orifice of the neck; it was completely obstructed, so that when a liquid was formed in the uterus, it was forced to enter the Fallopian tubes.

In the uterus of this patient were found several fibrous bodies, some projecting towards the peritoneum, and one equally distant from the two surfaces.

Cases similar to this case are reported every now and then, in medical journals, and we confess that we have never allowed ourselves to throw any liquids into the cavity of the womb, under any circumstances, without feeling that we were risking the patient's life. In the *Medical Times and Gazette*, for April 5, 1879 (page 383) is reported a case that might intimidate any one.

A woman was admitted to the St. Thomas Hospital, for uterine hemorrhage from which she had suffered for ten weeks, after the expulsion of a vesicular mole. By means of a Higgins's syringe, a solution of the perchloride of iron was injected through a considerably dilated cervix. The woman became suddenly collapsed *and died almost before the tube could be removed.*

At the post-mortem examination a small quantity of darkish fluid that contained a large quantity of iron was found in the recto-vaginal pouch. The fluid appeared to have entered the peritoneal cavity through the left Fallopian tube.

At the same time it is admitted that there are cases so threatening, that desperate means may be, indeed should be, resorted to, in hopes of affording relief; *melius anceps remedium, quam nullum.* The state of this question is well put by J. Matthews Duncan, in some remarks, from which I have quoted before; he says:—

"The dangers of carbolic acid, or of other ordinarily used injections, whether antiseptic or not, attach themselves almost exclusively to those which are intra-uterine. They are too grave to be passed over without full and special consideration; and they are quite sufficient, in my opinion, in the mean time, to render it inexpedient to resort to intra-uterine lotion without distinct indications; and it is well known that distinct indications imply distinct danger to life. Some authors, as Münster, and Schülein, regard intra-uterine lotions as quite harmless and as to be used in any, if not in every case. With such views I cannot at present concur. But it appears to me that, when putrid discharge flows from the uterus and is producing septicæmic fever, or when there is septicæmic fever referable to absorption of uterine secretions that are not putrid, the danger of life is so great as to justify some risk in the therapeutical proceedings, if there be good hope of doing good or saving life by them."

In the beginning of our notice of this work of Dr. Rendu, we said that it was, we firmly believed, to antiseptic matters we should look to prevent deaths from puerperal fever. It is not, however, by antiseptic washings-out of the womb that we should expect to do this, but by guarding by all means in our power, against the introduction from without of septic matters. In most cases of puerperal fever, the discharges are healthy, and there is no call for washing out the womb. The germs of puerperal fever come from without, and they must be destroyed before they are introduced into our patient. They are never produced spontaneously within, any more than any ovum is spontaneously generated. When the lochia are retained, and there is a putrid smell, and alarming symptoms arise, wash out the uterus, and use antiseptics, if you will; but if the case be truly one of puerperal fever, it will be useless. The great matter is this, *not to introduce the germs of the disease.* In childbed, as in other cases of injuries and lacerations, the presence of putrid matters may cause the symptoms of septicæmia, which disappear when the wounds are properly treated. True puerperal blood-poisoning is a very different affection, and we cannot too much insist upon this, that local antiseptic treatment is too late when its symptoms have declared themselves. The deadly germs are already admitted and we cannot destroy them by any means we know of now.

The definition of the term "puerperal fever" in the nomenclature of diseases drawn up by a committee appointed by the London College of Physicians is this: "A continued fever, communicable by contagion, occurring in connection with childbirth, and often associated with extensive local lesions, such as peritonitis, effusions into serous and synovial cavities, phlebitis, and diffuse suppuration." In some cases the local lesion does not exist; the poison may be so powerful, or the dose so large, or the patient in such a condition, that death may ensue before there is time for its development.

To mop out the cavity of the womb with a weak solution of sulphate of iron in glycerine, as recommended by one eminent obstetrician, or to make vaginal injections of the nitrate of silver or of the persulphate of iron, in quantities large enough to sear over the traumatic lesions of labour, as urged by another, in order to prevent puerperal fever is, to apply an old proverb, and to put the most favourable construction possible upon such practices, "locking the stable door after the mare is stolen." W. F. A.

ART. XXI.—*Transactions of State Medical Societies.*

1. *Transactions of the Indiana State Medical Society*, 1880, 8vo. pp. viii., 362. Indianapolis, 1880.
2. *Transactions of the Medical Society of the State of Tennessee*, 1880. 8vo. pp. 158. Nashville, 1880.
3. *Transactions of the Medical Society of Virginia*, 1879. 8vo. pp. 152. Richmond, 1879.
4. *Proceedings of the New Hampshire Medical Society*, 1879. 8vo. pp. 184. Concord, 1879.
5. *Transactions of the Medical Association of the State of Missouri*, 1879. 8vo. pp. 144. St. Louis, 1879.
6. *Transactions of the Medical and Chirurgical Faculty of the State of Maryland*, 1880. 8vo. pp. 216. Baltimore, 1880.
7. *Proceedings of the Connecticut Medical Society*, 1880. 8vo. pp. 194. Hartford, 1880.

1. IN his very able and interesting annual address, Dr. J. R. Weist, President of the *Indiana* Society, considers some of the great questions of State Medicine under the title of "Problems in Relation to the Prevention of Disease." He very pointedly discusses the political importance of the fact of the heredity of moral and physical attributes, and the intimate connection between intemperance and pauperism in the parent, and insanity and crime in the children; for the evils of hasty and ill-assorted marriages are only too clearly evident in the puny, cachectic, and nervous offspring of such unions. Attention is again called to the really appalling increase in insanity, tuberculous disease, and crime, in this country, as shown by statistics taken from the census returns; the cost of pauperism being twice as great in the United States in 1870 as it was in 1860, and three times as great in Indiana. "If the present rate of deterioration continues," says the author, "not many years will elapse before one-half of our people will be sweating and toiling for the other half in jails, penitentiaries, asylums, and hospitals." The evil consequences to physical development resulting from the modern school-room, in which a machine system of education is carried on, are also pointed out, the effects of which are to supplement and intensify inherited traits of mental and bodily disease. This instructive and able address was so well received and appreciated that 12,000 copies were ordered by the Society, to be printed for gratuitous distribution throughout the State.

In a brief essay, Dr. Wm. R. McMahan gives a clinical account of *The Icteric Form of Pernicious Fever*, containing a report of three attacks in two subjects, both of whom died. Hæmaturia occurred in both, blood corpuscles being detected in the urine. In each case chronic malarial trouble had existed. The hypodermic use of quinia he considered advisable, and insisted upon the importance of prompt treatment.

Ergot, its Use and Abuse, is the title of a practical paper by Dr. Wm. Commons, of Union City, which might be generally read with advantage by active practitioners. The effect of ergot as a medicine is declared to be "prompt, uniform, and specific," and its action "to cause the contraction of circular, muscular fibre, and a diminution of the calibre of tubular structures." It may be employed for its influence upon the bloodvessels of a part, in the destruction of abnormal growths, or in hemorrhages of typhoid fever and purpura. It produces abortion by diminishing the blood supply of the uterus and ovum. He teaches that, properly speaking, ergot is not a parturient agent, as it will not originate labour-pains, nor will it, in any way, facilitate delivery; but by its peculiar action on circular muscular fibres it may interfere with both of these. "It is not denied that ergot will increase the pains of labour, for this it will very readily do; it will enhance the agonies of child-birth very materially;" but owing to the rigid contraction of the circular fibres, caused by ergot, the delivery is often delayed until the child may be fatally asphyxiated. The dangers of hour-glass contraction and of retained placenta are also stated to be increased, and illustrative cases from practice are communicated by the author. The legitimate time for the use of ergot is declared to be when labour is about completed, and post-partum hemorrhage is feared; but there must be no obstruction nor delay in delivery of the fœtus and placenta, or the latter may be retained by hour-glass contraction. When given in large doses, he believes that ergot may cause death by spasmodic contraction of the heart from the specific action of ergot upon the muscular structure.

Dr. W. S. Haymond, of Indianapolis, contributes a paper upon *Human Longevity*, in which, after considering the cases of Thomas Parr, Henry Jenkins, the Countess of Desmond, and other celebrities, he arrives at the conclusion that the evidence furnished by the laborious researches of Thoms is probably correct, and these individuals were centenarians, but not much, if anything, beyond; although Parr may have been 102 when he died. His conclusions are formulated (p. 90) as follows:—

> "1. That science holds out to man the possibilities of one hundred years of life.
>
> "2. That one hundred years is the physiological limit, and that the laws of our organization will not permit a material extension of life beyond this limit.
>
> "3. That most of the public statistics heretofore collected in relation to centenarians, and current reports of persons living beyond a hundred years, are inaccurate and unreliable.
>
> "4. That there has been no incontestable proof yet produced in any country of an instance of longevity exceeding one hundred and six years, within the Christian era, and that we may safely conclude that it is barely possible for human existence to reach beyond this extreme limit."

Dr. Wm. Lomax, of Marion, communicates a case of *Ovariotomy, with Recovery*, in a woman æt. 46 years, performed with antiseptic precautions. The tumour was multilocular and fibro-cystic, weighing 13 kilogrammes. Prolonged shock succeeded the operation, so that she did not become fairly convalescent for about two weeks. During this period, borborygmus and extreme tympanites caused much suffering, requiring the insertion of a rectal tube, which was also utilized for nutritious enemata, on account of the great irritability of the stomach. Through a misapprehension on the part of the nurse, the patient accidentally received an overdose of chloral hydrate; and artificial respiration had to be maintained for seven hours before she revived, the respirations for the greater part of the time being only four per minute. In reviewing the case, the author suggests the employment of silk sutures for closing the abdominal incision, or a slight change in applying the silver ones, in order to conform with the method of Emmet.

In discussing a case of *Injury to the Head, with Fracture of the Skull*, Dr. Lomax also suggests the application of pneumatic force in elevating depressed fracture by means of a cupping-glass and air-pump. In compound fractures, where brain substance may be extruded, this, of course, would be inadmissible.

The paper upon *Expert Evidence, What is it?* by F. J. Van Voorhis, of Indianapolis, discusses and defines a question of general interest, drawing the distinction very clearly between testimony as to matters of fact, professional or otherwise, and an opinion expressed by "a witness, regarded by the court as competent to express an opinion, and permitted to do so, concerning the conclusion or conclusions to be drawn from facts shown to the court or jury." Testimony of this kind can alone be regarded as "expert evidence," and claim to be remunerated as such; and an expert can never claim pay for testifying to facts.

In a paper upon *State Medicine*, advocating harmony and associated action, Dr. J. D. Gatch, of Lawrenceburgh, urges more activity and interest in the profession on the subject of legislation to regulate the practice of medicine, and points out the fact that the passage of such acts by Illinois, Michigan, and Kentucky, and its agitation in Ohio, has had the effect of driving irregular and unauthorized practitioners of medicine into other communities, as Indiana and Pennsylvania, where no such restrictions exist.

A peculiar case of *Placenta Prævia*, in which hemorrhage took place within the membranes, is reported by E. S. Elder, of Indianapolis. The placenta being firmly attached at its circumference, separated at its middle portion and ruptured into the sack; there was no external hemorrhage at the time of delivery until after the rupture of the membranes. Some bleeding, however, had occurred about one month before, when the placenta became partially detached; this portion was subsequently found to be cicatrized at the examination. The patient was delivered by version, and made a good recovery.

At this meeting a measure was introduced by Dr. Jos. R. Beck, contemplating the establishment of a mutual aid association for life insurance among physicians, and a committee appointed to report at the next meeting.

The articles in these Transactions are notable for their brevity, and, including the President's Address, are twenty-two in number, upon various subjects. They exhibit a higher degree of merit than the average volume of State Society Transactions, but want of space forbids more than a brief notice of the more prominent points contained in the remaining contributions.

2. Dr. G. B. Thornton, in the *Tennessee* Transactions, advocates the open treatment for amputations, based upon cases treated in the Memphis City Hospital. The advantages claimed for this method being cleanliness, free drainage, and rest; it being more particularly appropriate in cases where primary union cannot be hoped for on account of the depraved physical condition of the patient. It is claimed that there is less danger of pyæmia or septicæmia by this method, which it will be remembered was advocated some years ago by Professor Wood, of New York.

The hypodermic injection of quinia in intermittent fever of severe type is incidentally mentioned in commendatory terms in an article by Dr. Tyner. Several cases are reported where irritable stomach, or gastric catarrh, prevented absorption from the alimentary canal, and the hypodermic plan was resorted to successfully. One patient received 105 grains of quinia sulphate in twenty-four hours; this was the only case where abscesses occurred out of a number of cases. The injection of ergotin every other day (gr. ij) for enlarged spleen is also highly praised.

Dr. Fordyce Grinnell, in writing upon *Iodine as a Substitute for Quinine*, reports very successful results from its use (ten drops given three times daily). He considers it second only to quinine, and urges further trial.

Under the title of a *Case of General Cirrhosis*, Dr. W. J. Miller reports what appears to be an illustration of scleroderma, terminating in death by pneumonia.

In a paper on *Bowel Disorders of Infantile Life*. Professor Deering J. Roberts, of the University of Tennessee, considers especially the causation of cholera infantum. He concludes that the intrinsic cause is age; the extrinsic causes being high temperature, foul air, improper diet, and unsuitable clothing, Professor Roberts, in the preparation of his paper, appears to have drawn freely upon one upon the same subject written by Dr. Frank Woodbury, and published in the *Medical and Surgical Reporter* (vol. xli. p. 177, for August, 1879), entitled "Some Observations upon Cholera Infantum, especially in regard to its Causation," the opening paragraph of which reads as follows:—

> "The intestinal disorders of infancy having diarrhœa as a common and prominent feature, which are so frequently encountered during the hot months of the year in all of our large cities, are, in this country, not rarely grouped under the generic title of summer complaint; but our systematic writers upon diseases of children distinguish at least three well-defined morbid states under this heading: 1st. Ephemeral, non-inflammatory, or simple diarrhœa; 2d. Entero-colitis of all grades of severity; and 3d. Cholera infantum."

Professor Roberts says (page 117 of *Transactions*):—

> "Bowel disorders of infancy, having diarrhœa, often profuse and exhausting in its character, as a common and prominent feature, so frequently met with during the hot months of the year in all of our large cities, and not limited exclusively to the cities, but also occurring in unpleasant frequency in rural districts, are generally grouped under the comprehensive title of summer complaint. Systematic writers, however, in order to be more definite, endeavour to distinguish three, and sometimes more, well-defined and distinct morbid conditions; some limiting their classification to simple, non-inflammatory diarrhœa, entero-colitis, and cholera infantum."

Other coincidences of expression occur, and the same authorities reappear to a large extent in the two essays; but, strange to say, no positive reference to the earlier paper appears.

3. The *Virginia* volume is made up of a presidential address by Dr. L. I. Joynes, of Richmond; reports by committees upon progress in special departments of medicine, and volunteer and invited papers. Perhaps the most interesting of the latter is one entitled *Diagnosis of Abscess of the Liver by Symptoms of Cerebral Hyperæmia, with some Remarks on Treatment of Hepatic Abscess by Aspiration*, by J. Marion Sims, M.D., of New York; in which two cases that came under the personal observation of the author were reported; both of which presented cerebral symptoms, insomnia and depression of spirits, and from these symptoms the existence of hepatic abscess was suspected by Dr. Hammond, and aspiration yielded $8\frac{1}{2}$ to 9 ounces of pus containing hepatic cells. Dr. Hammond is reported as having aspirated the liver for abscess twenty-six times within two years. In eleven cases no pus was obtained; the remainder

were perfectly successful. In the former cases no ill effects followed the puncture.

Dr. Faunsberry, of Staunton, furnished some *Clinical Reflections on thirty-three Consecutive Cases of Diphtheria* occurring among children at the Virginia Deaf, Dumb, and Blind Institution, during the fall of 1878. Evidence was conclusive that the disease was imported, and its extension was due to direct communication, a period of incubation of from three to fifteen days being observed. Only one death occurred; a favourable result which was attributed by the writer to systematically following out a supporting and stimulating treatment. Local applications of astringent and antiseptic character (R. Liq. ferri persulphatis, ʒj; acidi carbolici, gr. x; and glycerinæ puræ, ℥ss, M., applied with a camel's-hair brush, once daily, to seat of exudation) were considered very valuable. Implication of posterior nares was treated by daily syringing with the preceding solution much diluted (m. x, ad f℥j). Spraying the throat with lime-water was also frequently practised, and gargles of potassium chlorate, dilute sulphurous acid, and potassium permanganate gave great relief.

Dr. H. P. C. Wilson, of Baltimore, read a paper on *Paquelin's Thermo-cautery, with Wilson's Antithermic Shield, in Epithelioma of the Cervix Uteri.* The shield is a double, concentric, or hollow-walled tube surrounding the knife, except near its extremity. A stream of cold water passes constantly through the shield while in operation. He recommends that the benzine should be in a glass bottle held by a trained assistant, and carefully watched so as to avoid explosions, which have happened on several occasions. The knife should be heated only to a dull red heat for the removal of malignant uterine or vaginal growths.

The reports *On Advances in Hygiene and Public Health*, by Samuel K. Jackson, M.D., of Norfolk; and the *Report on Advances in Practice of Medicine*, by Wm. H. Bramblett, M.D., of Newbern, were prepared with care and are able and interesting communications, discussing briefly a number of practical topics that are now before the profession.

4. The papers read at the *New Hampshire* meeting were not numerous, nor were any presented that displayed much original research or striking novelty, but they were, however, uniformly able, interesting, and instructive. The President's address, by Dr. Alonzo F. Carr, of Goffstown, called attention to a decided improvement in the status of medical men, and the practice of medicine, since the organization of this Society in 1790, and especially within the last forty years. Owing to the general advance in intelligence upon medical and sanitary topics in this community, the quack has been left literally without a foothold in New Hampshire. Much sanitary work remains to be done in order to rid the community of preventible disease. The orator called particular attention to the relation existing between gastric fever, or diphtheria, and contaminated water supply, especially in the farming districts where "the sink water is discharged in many instances in close proximity to the well, and percolates into it," while the cess-pool frequently finds the same outlet for its fluid contents.

In conclusion, the writer discusses at some length the pathology and treatment of fractured radius near the wrist-joint. In setting this fracture "the rule should be never to leave the wrist until you are satisfied with its appearance." Special attention is directed to the manœuvre of Dr. Moore, of Rochester, for disentangling the styloid process from the annular ligament by rocking the joint laterally, and forward and backward, "for the purpose of liberating any fragment which might cause a degree of impaction and produce deformity if suffered to remain undisturbed." In treatment he recommends an extemporaneous splint, made of a shingle and piece of broomstick, something like a Bond splint, without the lateral pieces of leather.

Dr. D. S. Adams, in a paper on the *Differential Diagnosis of Mammary Tumours*, gives a very good table of disorders of the breast resembling cancer, and the points of differential diagnosis; including galactocele, congestion with milk, and chronic encysted abscess. He recommends for diagnostic purposes the use of the aspirator in suspected cysts, and in solid tumours the harpoon. Early diagnosis and promptness of action are especially required in mammary growths.

J. A. Watson, M.D., has studied an *Epidemic of Diphtheria*, in a country village, in which the malhygienic conditions causing the outbreak are very graphically described. A stagnant pond was under the schoolhouse, and communicated with two cess-pools upon the lot of ground occupied by the school. The village stood on the border of a mill-pond, choked with sawdust and refuse, which rotted under a July sun. No contagion could be traced, but without warning twenty-five children were almost simultaneously stricken with diphtheria. Following the diphtheria was an endemic of typhoid fever during the following month. It seems beyond question that in this case the diphtheria originated spontaneously from filth. In the treatment thorough ventilation is insisted upon, and among remedies muriated tincture of iron "is the sheet anchor" combined with chlorate of potash, small doses to be given every half hour. Nourishment was maintained by milk and lime-water. No cathartics were given; where a laxative was required mercurial chalk was ordered. No local applications with a swab or sponge were made use of. Total number of cases treated 110; number of deaths 11, which is a very favourable showing and speaks well for the treatment, for the epidemic was by no means a mild one.

5. In the eloquent and able address of the President of the *Missouri* Society, Dr. Schauffler, some of the dangers of popularizing scientific knowledge are discussed, and some of the means for increasing the respect of the community for the medical profession, are pointedly considered.

In some *Remarks on a few of the Surgical Diseases of the Pelvic Organs*, Dr. J. M. Richmond indicates the relationship between kidney disorders and strictures, and insists upon the importance of treating strictures of large calibre. The references to lithotrity, or litholapaxy, uterine displacements, ruptured perineum, and operations upon the rectum appear to be judicious, and the teachings sound.

Dr. C. H. Hughes read a paper containing *A Clinical Inquiry into the Significance of Absent Patellar Tendon-Reflex*, from which he concludes "that, while absent patellar tendon-reflex is often significant as an associated symptom of present locomotor ataxia, and may even serve when unassociated to excite suspicions of its approach, we are not justified in regarding it, when it is the only phenomenon observable, as a certain *sign;* or when it is absent, and the other symptoms are present, in excluding a diagnosis of posterior *sclerosis*" (p. 57). Dr. Hughes also presented a new æsthesiometer, which has some advantage for convenience over the ordinary forms in use.

An interesting specimen of *epithelial cancer* of the face, destroying the superior maxillary bone, was exhibited by Dr. J. F. Lutz, who also presented a report of a case of *hip-joint amputation* successfully performed for necrosis of the femur.

A good essay upon *Purulent Ophthalmias and their Treatment* was read by Dr. Chas. E. Michel, and was made the subject of discussion, in which some difference of opinion was manifested in regard to astringents, which the lecturer pronounced to be inadmissible in the acute stage.

Dr. A. J. Steele reports a *Case of Pseudo-Hypertrophic Paralysis* in a boy of eleven years. Dr. Wm. Dickson contributes a *résumé* of the principal *Mydriatics and Myotics and some of the Indications for their Use*, in which caution is impressed upon the practitioner against the indiscriminate use of atropia. A paper on *Bright's Disease*, by W. H. Bryant, M.D., and the report of a *Complicated Case of Urethro-Vaginal Fistula*, by Dr. Engelman, complete the communications. The volume is well printed with the exception of a few typographical errors, for instance, in the report on surgery in speaking of excision of the rectum, Dr. Levis is made to appear as Dr. Lewis, of Philadelphia. With reference to the subject matter, it is both interesting and valuable.

6. Dr. Jas. A. Stuart, of Baltimore, Chairman of the Section on Sanitary Science of the *Maryland* Faculty, presents a most seasonable report. His reference to the sanitary problems presented in Baltimore admit of application to other large cities as well. This truth cannot be too often repeated that filth is the foe of health, but the sacrifice of life must continue until sad experience impresses the fundamental principles of sanitary science upon communities as well as individuals. The consumption of pump-water, in large towns where cess-pools are multiplied, can have but one result upon the health and mortality of the community; this is a proposition the truth of which has been realized in the experience of Philadelphia (witness the celebrated cholera pump in 1854) and other communities (See Frankland's Water Supply of London and the Cholera[1]) before its evil effects were learned by Baltimore, where the pumps have been recently abolished, and only after earnest and persistent effort on the part of Prof. Stuart and his associates.

7. This well-printed volume of *Connecticut* Transactions, containing as it does about twenty papers of various length, but of uniform high standard of excellence, reflects great credit upon this mature society, now entering upon its ninetieth year of usefulness. In the Report of the Committee on Matters of Professional Interest, there is a communication embodying practical experiences in *Puerperal Eclampsia*, by Dr. E. F. Coates, with notes of eight cases in which the advantages of evacuants in the form of large doses of calomel and castor-oil are set forth, the author occasionally combining jalap with the mercurial. Venesection was practised where there was much tension of the circulation, even where other conditions were present, that under other circumstances would contra-indicate it. The results of this plan of treatment are certainly of a character to challenge attention, and although not new, it is worthy of a more extended application, in appropriate cases, than it now possesses.

In discussing the treatment of *Pneumonia*, Dr. J. D. Nelson, considering that the chief danger is from the high temperature and consequent weakening of the heart, recommends the antipyretic action of quinia, given in large doses (15 to 20 grains at once, each twenty-four or forty-eight hours), with jacket poultices, milk and lime-water, and champagne in generous doses. Where there is much pain, cold applications sometimes relieve the patient, but cold baths should not be given, on account of their tendency to increase the congestion of the right side of the heart.

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[1] Quarterly Journal of Science, 1867.

Dr. John Colton reports a curious case of *Compound Dislocation of the Knee*, produced in getting out of bed, in a large negro woman, who was subject to relaxation of the ligaments. The popliteal artery was ruptured, and the femur protruded from the wound. Amputation was performed at the knee-joint successfully.

In the treatment of *Diphtheria*, Dr. J. C. Fox recommends chloral in glycerine (one part to five), as a topical application, three times daily; with potassium chlorate internally. In several cases, on the second day of application, the characteristic fever entirely disappeared, and the exudation ceased to spread.

Dr. W. H. Carmalt, of New Haven, contributes a very able dissertation, entitled *Some Limits in the Use of the Ophthalmoscope*, showing that many of the conclusions drawn by unskilled observers, have been based upon incorrect conclusions, inspired by a want of knowledge of the physiological variations in the appearances of the retina. For instance, he says that no one should make a diagnosis of atrophy before testing the vision in the ordinary method, using the ophthalmoscope to confirm rather than direct the testimony of the other physical signs. Cerebroscopy by no means occupies the exalted position that some neurologists have enthusiastically claimed for it, or that Bouchut would have us believe. Indeed, it is even stated on good authority (in a quotation from Dr. Pomeroy, of New York), that, ordinarily, neurologists are unable to state whether or not, in a given case, there was any disease of the eye.

Dr. N. F. Wordin, in an essay upon *Examination of the Eye as a Help to the Diagnosis of Extra-ocular Disease*, takes a much more favourable view of the utility of the Ophthalmoscope to the general practitioner than Dr. Carmalt does, and urges its wider application as a ready means of diagnosis, especially in obscure diseases.

An essay upon *The Insane Diathesis*, by Dr. H. P. Stearns, of Hartford, is a thoughtful and very instructive paper, which deserves a wide circulation. This paper is well supplemented by a shorter one, entitled *A Notable Defect in Medical Education*, by Dr. D. A. Cleaveland, which urges upon physicians in general a careful study of insanity, in order to decide upon the form of insanity under which a patient labours—a matter of much importance in connection with the question of treatment, whether it shall be in a close walled asylum, or at home, surrounded by his family and attendants. F. W.

ART. XXII.—*Fracture of the Patella. A study of one hundred and twenty-seven cases.* By FRANK H. HAMILTON, A.M., M.D., LL.D., Visiting Surgeon to Bellevue Hospital, etc. 8vo. pp. 106. New York: Chas. L. Birmingham & Co., 1880.

THIS monograph consists of four papers, or chapters. The first gives the notes of cases under the author's own observation; the second treats of cases in Bellevue Hospital, a few of which were seen by Dr. Hamilton; the third is a summary of the 127 cases; and the fourth discusses the general subject of fracture of the patella, being the substance of clinical lectures delivered by the author at Bellevue. The first two chapters, consisting of 73 pages, are occupied with running notes of cases, and will probably never be read. They furnish an instance of a very common fault in medical literature. Authors are very prone to load their papers with unimportant details of date, temperature, pulse-rate, treatment, etc., so that many pages of our best journals are read by none except the compositor and proof-reader. It is often proper and sometimes necessary to give the reader opportunity to study the individual cases, but, as a rule, much unnecessary matter is thus added and the value of the literary work correspondingly depreciated.

The third chapter of the book, which contains but five pages, is worthy of careful perusal, as is also the fourth chapter of 19 pages. As there is no index, and not even a table of contents, the value of the first two chapters is still less than would be expected from the character of the matter contained in them. A good reference table of some sort would enable the reader to extract some benefit from the long list of histories; but, even where the special cases are referred to in the summary, the numbers are at least sometimes incorrect.

In the work we find many views now generally held by surgeons confirmed by analysis of this large number of cases. In 107 of the 127 cases muscular action is believed to have been a factor of more or less importance in causing the injury (p. 88). This seems substantiated by the prevalence of the fracture in the more muscular sex and in the more muscular period of life. Only three cases of any form of the fracture occurred under 20 years of age, and only five after 60 years. The direction, situation, and mechanism of the fracture corroborate this view. In the whole number of cases comminuted fracture occurred nine times, and compound comminuted fracture twice.

In his remarks on treatment, the author remarks that "nearly all of the recognized plans of treatment were adopted, but in a majority of cases the same plan of treatment was not continued from the beginning to the close; and it would be difficult in most cases to say to which particular method the result must be ascribed." This certainly saves all bad forms of treatment from receiving deserved opprobrium; but, alas! it awards no merited prize to any good form of treatment. One hundred and twenty-seven cases of fracture of the patella have been compiled and studied by the most distinguished living writer on fractures; but, lo! as the Latin proverb has it, a ridiculous mouse is born of the labour.

The author's remarks (pp. 90–95) on the pathological conditions accompanying fracture of the patella, and on the occurrence of tilting of the fragments during attempts at approximation, are interesting, instructive, and suggestive, and worthy of the pen of a well-known authority on fractures.

In discussing the treatment (p. 105), he states that he no longer recommends the wooden inclined plane figured in his *Treatise on Fractures and Dislocations*; for, though the principle is correct, it is unnecessarily cumbrous. He prefers to elevate the limb and apply a moulded posterior splint—of leather or of some firm and easily moulded material—from the middle of the thigh to the ankle. The limb is then bandaged from ankle upwards and from hip downwards, and the fragments maintained in position by circular turns of the roller just above and immediately below the patella.

In searching among the histories of the cases the reviewer has found one treated with Malgaigne's hooks (Case 59). It is possible that others may be hidden in the great mass of cases, and have been overlooked. Here strips of leather were fastened by adhesive plaster to the edges of the fragments, and the hooks inserted into or above these protective pads. Although the patient was discharged with only one-quarter inch separation, no further use of this method of treatment appears to be mentioned. If the good results obtained with Malgaigne's hooks, in Philadelphia, are to be believed (and the present writer certainly does believe them), this plan should have been pursued in many more cases. Analysis of a number of cases treated by the radical or hook-method would have added much to the value of the monograph.

In conclusion, it may be said that the twenty-four pages constituting the last two chapters would make a good journal article, but it is difficult to see why their merits should be buried in a book containing so many pages of useless matter. Those who honour Dr. Hamilton as an authority will be disappointed in a book which even his name cannot raise above mediocrity. J. B. R.

ART. XXIII.—*Naso-pharyngeal Catarrh.* By MARTIN F. COOMES, M.D., Professor of Physiology, Ophthalmology, and Otology in the Kentucky School of Medicine; Visiting Surgeon to the Eye and Ear Department of Louisville City Hospital, etc. 8vo. pp. 165. Louisville: Bradley & Gilbert, 1880.

WE are told in the preface to this volume that it has been reluctantly written for the use of general practitioners of medicine, at the request of numerous friends. Of the 152 pages of text, some 20 are consumed in descriptive and minute anatomy, 19 are devoted to a reprint of Dr. Ephraim Cutter's article on Infusorial Catarrh, and 33 are taken up with brief records of cases. The ground occupied includes the drum cavity of the ear, the nasal passages, and the pharynx; and the subject matter is presented without exaggeration or pretence. Some of the illustrations are good, a few of them execrable. An attempt to use Lewin's apparatus for generating nascent vapour of chloride of ammonium as indicated in the illustration would be apt to lead to accidents; for the bottles containing the acid and ammonia are represented as nearly full, while they should be nearly empty. A nostril dilator devised by the author seems admirably adapted for the purpose, as far as can be judged of by the illustration. It is similar to Fraenkel's, and the inference gathered from the context is that it is entitled to precedence.

While there is nothing in this volume that merits special commendation, there is nothing that calls for special criticism; and, had it been condensed, and arranged more systematically, it would have enhanced the credit of its author, for brief practical works on special topics always command readers. As a first effort it is meritorious, and will be serviceable to practitioners who may be without access to current literature on the same subject. J. S. C.

Art. XXIV.—*Transactions of the Obstetrical Society of London.* Vol. XXI. for the year 1879. 8vo. pp. lxii. 373. London: Longmans, Green & Co., 1880.

It may be interesting to some of our readers to learn that this Society holds one meeting in every month of the year but August and September; that the usual attendance is now from fifty to sixty; and that Dr. William S. Playfair is its President.

The opening paper of this volume is on *Extra-uterine Fœtation.* Dr. Priestley exhibited the bones of a fœtus which had been removed from time to time through an opening formed spontaneously in the Douglas cul-de-sac nearly twelve years after the occurrence of the abnormal pregnancy. He advocated waiting for nature, except in cases where the symptoms indicated immediate danger to life. The discussion opened an important question which we have already fully set forth in this Journal, and which must frequently arise in such cases, viz., Is it not more hazardous to wait than to operate? The opinion of the Society, as far as it was expressed, appeared to favour interference, by opening the fœtal cyst through the vagina when practicable. A full discussion of this subject is well worthy of the attention of the Society, as the views of many are changing in regard to the management of extra-uterine cases, and operations are becoming more frequent than in former years. Dr. Veit, of Bonn, has taken the initiative in an attempt to save the life of a woman during hemorrhage from a ruptured Fallopian cyst. He was unfortunate in the result; but we believe the operation must in time meet with success, having seen cases, after death, where the conditions were such as to have made ligation practicable. Two children have been saved in this country by primary gastrotomy, but the women were lost in ninety hours and five days respectively. Where the fœtus has been destroyed within the cyst, it has been found to act afterward in several instances as an element of danger by exciting attacks of peritonitis.

In a paper on *Digital Dilatation of the Os in Labour*, Dr. James Braithwaite advocated the use of the fingers in dilating the cervix in cases where the first stage of labour is unduly prolonged, employing first the index fingers of both hands opposite the pubes and sacrum, then two fingers behind and one in front, and finally two fingers of each hand, separating the parts by traction in imitation of the effect produced by pressure of the head. He illustrated the subject by the recital of five cases of labour in which he had adopted the method with success. Nos. 1 and 2 were cases of convulsions, both primiparæ. In No. 1 the dilating process required less than an hour, when delivery was completed by the forceps; in No. 2 labour progressed naturally after dilatation, and the patient delivered herself; both recovered under chloroform. No. 3 was a 6-para, in labour with twins; first stage very much prolonged; after partial dilatation labour advanced naturally. No. 4, also a 6-para, with waters broken early, but head making no advance; digital dilatation soon effected a change, and she was delivered by the forceps without much difficulty. No. 5 was a primipara with rapid and strong pains, but no progress; dilated with two fingers every quarter of an hour, and then with three fingers during an hour and a half, and then ceased. In two hours os fully dilated; in four, labour accomplished.

In the discussion, the opinion of the Society appeared to favour the employment of chloral and chloroform; and the dilatation under hydrostatic pressure, if it should be then required. We have heard very decided objections made to digital dilatation in this city. The method proposed is an improvement, and although not to be recommended as a frequency, may become of useful necessity where proper appliances and remedies cannot be obtained. There is great danger of an indiscriminate use of such a method of dilatation in this hurrying age.

Septicæmia and Cardiac Thrombosis.—Reports of cases were made by Drs. Roper and Musgrave, death in the first case occurring in nineteen days after delivery, cardiac symptoms having existed a week; and in the second in twenty-nine days after an abortion at three months, the placenta being retained several days and then discharged in very offensive fragments; cardiac symptoms detected five days before death.

Our chief interest in these cases centres in the discussion, from which we make several extracts, as the subject has a special interest just now, in view of the cause of death in Dr. Isaac E. Taylor's case of Porro's operation reported in the last number of this Journal.

> Dr. Barnes said: "The immediate exciting cause of thrombosis seems, in the great majority of cases, to be the ingestion of septic matter into the blood. The blood of pregnant women is, as we know, highly charged with fibrin; it is highly coagulable, but during pregnancy thrombosis is rare." He had seen two or three decided cases. "During pregnancy there is no septic matter supplied, but after labour, when involution sets in, this is rapidly poured into the blood, and if the glandular system, liver, kidneys, skin, mucous membrane of intestinal tract, are not in good working order, noxious matters will accumulate in the blood, and thrombosis may ensue."
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> Dr. Cory spoke of "the importance of rest after labour or miscarriage as long as any offensive discharge continues." He remarked: "We certainly see the good results of leaving external wounds at rest, even though they be bathed with fetid pus, yet as long as the surface remains undisturbed absorption does not take place; disturb and break up the filtering surface, and you get all the symptoms of septicæmia."
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> Dr. Gervis believed that "in every case, even in those in which Dr. Barnes had said there might be a clean uterus, careful examination of the pelvis would discover indications of pelvic inflammation, the result, it might be, of some vaginal ulceration which had healed, the uterus itself not becoming affected."
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> Dr. John Williams "referred to a recent case of embolism after post-partum cellulitis, phlegmasia dolens, and pelvic abscess. After the opening of the abscess the patient was doing well, when she got up and made a slight effort, which was followed by a rigor. She died in three days, and multiple small abscesses were found in the lung, set up by emboli, which had been carried from a thrombus of the external iliac veins." He had never seen phlegmasia dolens without pelvic cellulitis.
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> Dr. Braxton Hicks said "that the low circulation from anæmia after excessive hemorrhage had often much to do with thrombosis. He had seen a case of probable embolism with thrombosis without any evidence of cellulitis or enlargement of the uterus."
>
> Dr. Edis remarked "that in cases of septicæmia, attended or not by blocking of any of the veins, the profession was unanimous in insisting upon the most absolute rest and quiet, in order to avoid any risk of thrombosis. He thought, though, it was possible that by insisting too rigorously upon the recumbent position during the first nine days following a confinement, more especially if we had any reason to believe that any clots were retained in utero, or where the lochia was at all offensive, we incurred the risk of producing that which we were always so anxious to avoid, viz., septicæmia, by preventing the escape of putrid discharges."

Dr. Edis proposed permitting the patient to sit up a few minutes at a time, especially in defecation and urination, that noxious matters might be drained or forced out. Dr. Goodell, Philadelphia, has tried this system of drainage, with excellent results in the prevention of puerperal fever in his wards, for a number of years.

Dr. C. H. F. Routh reported a *Case of Extra-uterine Pregnancy.* This abnormal condition occurred in a woman of 22, probably single. To prevent rupture, the cyst was punctured by the aspirator through the rectum in the third month. Two or three ounces of serous fluid escaped, followed by about a pint of blood. Hemorrhage was arrested by injection of solution of perchloride of iron. In three days the cyst filled up and became tense; on the fourth day burst; and patient died in ten hours from hemorrhage. No signs of peritonitis were discoverable, or trace of the puncture. In this case, as in many others, the diagnosis was rendered difficult by the fact that the woman menstruated regularly.

We have here another instance of the dangers of aspiration, as well as of rupture in Fallopian pregnancies. Destroying the fœtus by puncture; electrolysis; the injection of morphia; and tapping the cyst, are all dangerous expedients. So likewise is cystotomy and the removal of its contents save the placenta; but in this event the woman is cured, if the operation does not prove directly fatal; which may not be the case where the dead fœtus is left *in situ.*

The discussion of Dr. Routh's paper shows how diverse are the views of obstetrical surgeons upon what is to be done in cases of extra-uterine pregnancy; whether to aspirate by the vagina, or rectum, or not at all: whether to operate for the removal of the contents of the cyst, per vaginam; or by gastrotomy; and whether to ligate and remove the cyst itself by abdominal incision, either before rupture; or after it shall have taken place.

Advanced gynæcology in this country recommends the removal of the cyst where practicable; in the early months by the vagina, and in the later by the abdomen. Parties are divided as to the propriety of the primary operation by gastrotomy, as the risk is less after the death of the fœtus. But the danger of rupture of the cyst at maturity, has determined some operators to open it during the life of the child. The cases as yet have not resulted encouragingly, as in that of Dr. Jessop of Leeds, except that the children have been saved; but success is by no means unattainable.

In the case of rupture of a Fallopian cyst in the early months, we are gradually coming to believe that the abdomen should be opened, the hemorrhage arrested, and the peritoneum cleansed of blood. Several autopsies have shown that the operation of removing the cyst would have been quite practicable; hence the opinion held, which may some day be put into practice. Dr. Veit, previously referred to, has we believe been the only operator in a case of Fallopian rupture, and his patient died. Others will no doubt follow, and success must sooner or later result, provided the cases are such as one we examined after death, in which there were no adhesions, and the hemorrhage was slowly fatal. In one case in New York the lady lived 60 hours—the diagnosis was made by Dr. Thomas—the operation was declined, and the autopsy showed that it was a very favourable case for ligation.

The discussion on the forceps, which occupied parts of three meetings, and fills 112 pages of the volume, it is impossible to condense. Part of it has already been laid before our readers in the *Monthly Abstract*, as the views of Dr. Barnes.

Unilocular Cyst involving both Ovaries, and with both Fallopian Tubes attached.—Mr. J. KNOWSLEY THORNTON, of the Samaritan Hospital, reported that he had seen this peculiar condition four times in examining over 500 ovarian tumours. The four were all among his own cases. The condition is a puzzling one to the operator and pathologist, as upon a single cyst we find the two Fallopian tubes, and can trace them distinctly to their fimbriæ.

Case of Inguino-ovarian Hernia (double), operation, recovery, was reported by Mr. Thomas Chambers. Woman 24, single, a housemaid, Irish—hernias discovered in hospital at age of 12, after which the lumps became gradually larger and more painful from year to year. Came under observation in London in March, 1879, was then 5 feet 9; had a well developed bust; had never been *unwell;* voice feminine; no hair upon the pubes; inguinal tumours painful, and sensitive to the touch; had existed as long as the patient could remember; vagina found to be cone-shaped and about an inch long, with no os uteri; no uterus or ovaries discoverable in the pelvis; never had sexual desires. The ovaries (?) in the groins were removed, and the woman recovered. The abnormal bodies were examined by a committee, and pronounced to be *testicles*, "the glandular structure of which had never undergone its normal development."

According to Englisch of Vienna, who collected 27 inguinal cases, 9 femoral, 1 sciatic and 1 obturator; there were double herniæ in one-third of the inguinal cases, and one-half of those operated upon by removal died. The chief value of this report lies in the fact that the bodies removed were shown by the microscope to belong to the male sex. As in these congenital cases the uterus is sometimes absent, it is probable that the bodies removed are occasionally unrecognized testicles instead of ovaries, as we find them to have been in this instance.

Fibroma of both Ovaries.—This rare disease was found by Mr. Cullingworth of Manchester in a widow of 36 who died in St. Mary's Hospital, March 11th, 1879. She had first noticed a swelling in the right groin after the birth of her fifth child, five years before; and was affected at the time of her admission with slight uterine hemorrhage, which lasted continuously for three months; the patient had a florid healthy appearance. The uterus was not enlarged; the tumours were easily defined; were attached by broad pedicles, and there was no fluid in the abdominal cavity. The hemorrhage continued three months, and then ascites set in followed by pleurisy, of which she died on September 11th, 1879.

The tumours were found non-adherent; right, weighed 9 ounces, and left 22; both solid throughout with the exception of a serous cyst, about an inch in diameter, in the substance of the right one just beneath the capsule; no portion of the normal tissue of the ovaries remained.

Mr. Spencer Wells met with only three cases of fibroma in more than 800 ovariotomies. Keith does not mention it in his tables. W. L. Atlee mentions one case, which was not examined microscopically. Peaslee says he had seen two cases; but one is said by Dr. Thomas to have been fibro-cystic in character. Kœberle does not report a case. Spiegelberg met with two, one weighing with the uterus 66 pounds. Three specimens have been shown at the Obstetrical Society of London; Lawson Tait removed one weighing 9 pounds. Two were exhibited to the Philadelphia Obstetrical Society; one by Goodell, weighing 4 lbs. 4 oz., no microscopical examination mentioned. Cases of double fibroma ovarii are upon record, but the want of a microscopic test diminishes their value as specimens of this rare disease.

Mr. Cullingworth, in answer to inquiries as to malignancy of character shown by the pleural and peritoneal effusions, stated that a "very careful and minute inspection failed to discover more than a thickened and opaque condition of the pleura and peritoneum."

The ovarian tumours were examined by Drs. Thornton and Doran, who inclined to the belief that incipient carcinomatous degeneration existed, but could not be positive, as the specimens had been injured for a minute microscopical study by *post-mortem* softening. Dr. Dreschfeld, who had examined a section prepared by hardening in alcohol obtained when the tumours were fresh, was of a different opinion. He said, "the tumour is a fibroma. The more closely-packed cells, found in addition to the fibres and tissue-corpuscles, are not epithelial in character or contained in alveoli, and therefore cannot be regarded as cancerous; while the well-developed walls of the fully-formed bloodvessels in their neighbourhood, and the abundant matrix preclude the idea of sarcoma."

The bibliography of Mr. Cullingworth's paper is very abundant and complete, and furnishes a valuable series of references to any one who may desire to investigate the subject more fully.

In a *Report of experimental inquiry, instituted to determine with what fluids and by what methods the operation of blood transfusion may best be performed, and to ascertain the effects, immediate or remote, which result from the operation in animals*, Mr. Schäfer relates thirty five experiments upon animals; 16 of transfusion of milk without, and 3 with previous depletion, and 16 of transfusion of blood with previous depletion. The trials with milk were made upon rabbits, dogs, and cats; those with blood, upon dogs and cats. Ordinary milk proved fatal to 5 rabbits, and 1 was unaffected. Boiled milk did not affect two of three rabbits experimented upon, and the third was apparently unaffected: it died 8 days afterward, and parasitic cysts were found in its liver. Boiled milk was not fatal to one dog, and ordinary milk to three cats, experimented upon. Freshly drawn milk received into a superheated vessel did not affect the two rabbits upon which it was tried. A dog, cat, and rabbit all died in a short time after the transfusion of ordinary milk, following previous depletion. . . . The experiments with blood can only be understood by a reference to the original table.

On page 331 we find the following:—

> "*Dogs and cats* not previously depleted, resist the action of the septic organisms which the unboiled milk contains, much better than do rabbits. Quantities which would certainly have proved fatal to rabbits, were without any apparent effect in dogs and cats. In *depleted animals*, the injection of milk produced a slight temporary rise in the blood-pressure, but this very speedily disappeared, the pressure sometimes falling below the point at which it was before the injection. There was never any apparently beneficial effect. Ordinary unboiled milk which contains the germs of septic organisms is highly injurious to depleted animals, and ought never to be employed for transfusion."[1]

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[1] "Shown long ago by Lower, but forgotten or disregarded. In modern times the subject has been again examined, and results almost exactly similar to mine have been obtained by Howe and Dupuy in America. Howe's dogs all died promptly. And yet Dr. Gaillard Thomas and others are not deterred from using milk for transfusion in the human subject."

There is a speciousness in the reasoning of Mr. Schäfer, which requires attention. Dr. Howe injected milk brought into New York from the country. Dr. Dupuy repeated his experiment, with *immediately drawn* milk, and found the fluid perfectly harmless in this form, as did also Mr. Schäfer. If all of Mr. Schäfer's experiments, or even the half of them, had been made with "immediately drawn" milk, they would have been made much more satisfactory, as no one has for a long period questioned the fatality of transfusion with ordinary milk. Drs. Thomas and Hunter were not influenced by these experiments of Howe or Dupuy; but by those of Hodder, of Canada, who in 1850 saved two patients during an epidemic of Asiatic cholera. When Dr. Howe injected f℥vj of fresh goat's milk into the cephalic vein of a patient affected with phthisis, there was an improvement for a time. Dr. Thomas *thinks* that he saved the life of a lady, after hemorrhage from the uterus following ovariotomy, by the injection of f℥viij of cow's milk drawn at the door of the house of the patient and used at once. There seems to be a difference of opinion here, in which we think Dr. Thomas has as yet the advantage. In the discussion which followed the reading of the paper, it appears to have been thought that the experiments of Schäfer were final and conclusive against the transfusion of milk in the human subject in any form; at least there was no opposition to the following opinion:—

Dr. Playfair said, "one good resulting from" the report "would be that it would place the operation of transfusion on a more scientific footing, and would at once put a stop to such experiments as the transfusion of milk and other fluids, of which we have heard a good deal from America, and the unscientific value of which, it seemed to him, Mr. Schäfer's report had conclusively settled."

We think that in all probability Drs. Thomas and Hunter may have something to say in reply, and therefore leave the matter of argument to them. The chief conclusions of Mr. Schäfer from his experiments are as follows, viz.:—

> "1. Ordinary milk is highly detrimental, and ought never to be used for transfusion."
>
> 2 and 3. The same may be said of solution of salt and other watery fluid, and of the blood and serum of the lower animals.
>
> "4. The only fluid which can be employed with any benefit for transfusion in the human subject is human blood, and this may be in the normal or in the defibrinated condition."
>
> "7. The simplest and best form of apparatus is a short flexible tube, terminating in glass canulas, which is used to connect either a vein of the giver to a vein of the patient, or an artery of the giver to an artery of the patient."
>
> "8. The amount of blood used may be measured by the time of flow. Enough blood would probably flow from vein to vein in three or four minutes; from artery to artery (toward the heart) in half a minute or a minute."

Mr. Schäfer evidently prefers the transfusion from artery to artery; a plan which will probably have but few advocates. His paper is worthy of being carefully studied by every one contemplating the performance of this restorative operation. We cannot admit the conclusiveness of his experiments, and would suggest to some experimenters a modification of them, as the foundation for a valuable medical thesis. If the ordinary milk of the market produces death when injected into the veins of a rabbit, it will not do to say, *ergo*, we should not use *immediately drawn and strained milk*, kept at 99° Fahr., upon the human subject. Try the latter upon a number of rabbits, cats, and dogs after depletion, and then we may argue from the result, as to the danger or safety of the same in a man or woman after hemorrhage. R. P. H.

NOTE.—Dr. Schäfer, in a note to Dr. Playfair, and in reply to one from the reviewer, says that the reason why milk is not beneficial in transfusion after depletion is, that it does not contain hæmoglobin. "Lister has shown that milk drawn directly from the teat into a physiologically clean vessel will, if protected, keep an indefinite time perfectly sweet and good; and I do not doubt that milk so obtained would be innocuous. But certainly it would not be more beneficial than three-quarter per cent. salt solution, and it has been shown over and over again that the effect of this in raising the blood-pressure after depletion is only transitory, and an animal dying, as depleted animals almost always die, of apoplexy from want of hæmoglobin to carry oxygen to the nervous centres, could not be benefited by either fluid."

ART. XXV.—*Eyesight: Good and Bad. A Treatise on the Exercise and Preservation of Vision.* By ROBERT BRUDENELL CARTER, F.R.C.S., late Hunterian Professor of Pathology and Surgery to the Royal College of Surgeons of England; Ophthalmic Surgeon to St. George's Hospital, etc. 12mo. pp. 265. London: Macmillan & Co., 1880.

THE preface of this little volume informs us that "a large portion of the time of every ophthalmic consultant is occupied day after day in repeating to successive patients precepts and injunctions which ought to be universally known and understood. The following pages contain an endeavour to make these precepts and injunctions, and the reasons for them, plainly intelligible to those who are most concerned in their observance."

In the thirteen chapters which follow, Mr. Carter shows himself a skilled and practised writer, and gives a very satisfactory popular statement of most of the subjects on which he treats; but we think it may fairly be doubted whether Mr. Carter will live long enough to see all this matter carefully thought over and thoroughly mastered by his numerous consultants, and we can but wish him "long life and faithful patients."

In chapter seven we have a clear and pleasant discussion of the main facts relating to Myopia and of the best methods of preventing its increase. In the following one on Asthenopia we find a quotation from Dr. Ezra Dyer (formerly of this city), now of Pittsburg, Pa., stating clearly his method of treating it, instructions which, our author remarks, "on this side of the Atlantic are generally less known than they deserve."

We read with much pleasure the excellent chapter on the "Care of the Eyes in Infancy and Childhood," until a steadily growing sensation of having been previously familiar with it caused us to turn to the admirable work of Arlt on the "Care of the Eyes" (a work unfortunately quite neglected in this country, and apparently also in England), where it became evident that whole sentences are literally translated from the German and embodied in Mr. Carter's work.

The statement in the preface that "I have derived valuable suggestions from "Die Pflege der Augen of Professor Arlt," certainly does not warrant any such free borrowing; and the fact that in other portions of the chapter he does use quotation marks to indicate the passages borrowed from Arlt, renders it difficult to believe that the omission is due to the hurry and press of work which causes our author always to use a type-writer for producing his copy, and to make use of Dr. Thursfield's writing-frame (for the blind and those with impaired vision), in every railway journey, that none of his thoughts shall escape prompt publication. The directions on pages 167–168 and 169, 170, and 171, for cleansing the eyes of new-born infants, and for the treatment of ophthalmia neonatorum, as well as the remarks, at pages 175 and 176, on the use of the eyes by children, in playing with their toys and pictures, are probably the most striking examples of this plagiarism.

Mr. Carter regards the doctrine of any specific atrophy of the optic nerves as arising from the use either of tobacco or of alcohol as "not proven."

> "Optic nerve atrophy, occurring in an intemperate person, like any other malady which may afflict or punish him, is probably at least so far connected with his vice that he would have been less likely to suffer from it if he had been a sober man. When I have admitted this I have admitted all, as far as I am aware, which can be said to be sustained by any kind of evidence. To go farther, not only with reference to nerve atrophy, but also with reference to other forms of disease, more especially, perhaps, to insanity, is not only to lose sight of scientific precision and exactness, but also, in many cases, to incur the risk of libelling the unfortunate. People who are unaccustomed to reason hear that a large proportion of the inmates of an asylum have been intemperate before they were placed under restraint; and they cry out, 'See how drink is a cause of insanity!' They forget that the other view is at least equally tenable; and that the case may be as fairly stated by saying, 'See how insanity, in its earlier stages, is a cause of drunkenness.' The man who would preserve the full integrity of his functions to a ripe old age must avoid excesses of every description, and must endeavour to employ the higher faculties of his mind somewhat more energetically than is now always customary. A time comes to every one when the physical powers begin to decay; and then, unless the brain has been kept active and recipient by exercise, there is nothing left to live, and the man perishes. We say that he died of gout, or of overeating, or of heart disease, or of kidney disease, or of the failure of the particular organ which was the first to exhibit symptoms of the approaching end. In reality, he has died of stupidity, artificially produced by neglect of the talents with which he was endowed. That which is true of the organism as a whole is true also of its parts; and the eyes, among others, are best treated by an amount of systematic use which preserves the tone of their muscles and the regularity of their blood supply."

In his practical hints on spectacles our author scarcely does justice to the many ingenious modifications of eyeglasses, and the key to his indifference is, perhaps, to be found in the statement, on pages 136–137, that circular spectacle lenses are necessary evils in London, because the workmen, in cutting the glasses oval, are apt, from want of accurate knowledge of what they are about, to "displace the position of the axis, and to spoil lens after lens before they succeed." "Americans, as a rule, will not wear spectacles with circular glasses. The effect of their determination is that the opticians of New York and Philadelphia, not to mention other places, make cylindrical lenses of oval shape with absolute correctness."

We can recommend Mr. Carter's work as, in our opinion, the best on this subject in the English language, and sincerely regret that it should be disfigured by the plagiarism above alluded to. W. F. N.

Art. XXVI.—*The Diagnosis of Diseases of the Spinal Cord.* By W. R. Gowers, M.D., F.R.C.P., Assistant Professor of Clinical Medicine in University College, etc. 8vo. pp. viii., 80. London: J. & A. Churchill, 1880.

This little book is a trustworthy and well-digested statement of the chief points in the differential diagnosis of diseases of the spinal cord. It embodies an address delivered by Dr. Gowers to the Medical Society of Wolverhampton; numerous additions having been made before its appearance in its present form. Although the recent literature of the nervous system is appalling in quantity, yet books which do something towards sifting and arranging the chaos of discovered facts are not without a real value. Dr. Gowers is a pointed and practical writer.

The subject is considered under the following heads: I. Medical anatomy of the spinal cord. II. Physiology of the spinal cord in relation to the symptoms. III. Indications of position of disease—anatomical diagnosis. IV. Indications of nature of disease—pathological diagnosis. V. Illustrations of diagnosis.

Very true is the remark that hysterical symptoms are often present in the subjects of organic disease in all parts of the nervous system. Striking symptoms of hysteria are frequently present, for instance, in cases of tumour of the brain. Patients may be hysterical in the extreme; they may even simulate many of their symptoms, and yet they may be suffering from the most serious organic nervous disease. The young specialist, imbued perhaps with a one-sided notion of the freaks and cheats of hysteria, is especially liable to be led into error in regard to this point in diagnosis.

Reflex action is treated in a lucid and interesting way. The author begins with a diagram and illustration of a reflex loop in the cord. He considers separately the various superficial reflexes—plantar, gluteal, cremasteric, abdominal, epigastric, and scapular,—showing what part of the cord is concerned in each special reflex manifestation. The well-known cremaster-reflex, for instance, in which the testicle is drawn up when the skin on the inner side of the thigh is stimulated, arises at the level of the first and second lumbar pairs of nerves. In the illustrations of diagnosis at the end of the book, he shows clearly and cleverly how the trunk and limb reflexes can be turned to great use in regional spinal diagnosis. Through a study of the reflexes we have the means of ascertaining something of the condition of almost every inch of the spinal cord from the cervical enlargement downwards.

The importance of the ankle clonus in diagnosis is emphasized by the assertion, which we believe to be correct, that it can never be obtained in health by sudden passive tension.

Dr. Gowers holds that it is most probable that movements are not, strictly speaking, co-ordinated in the cord, the probable seat of this function being the basal ganglia of the brain. Disease of the posterior columns may interfere with the influence of the co-ordinating centres upon the muscles or lower centres. His discussion of the different causes and forms of locomotor ataxia will be found instructive to those who, like ourselves, have met with cases which will not answer in all respects to what we would expect to find in posterior spinal sclerosis.

Some useful hints are given in regard to the use of electricity in the diagnosis of spinal affections. We would like to have had a fuller discussion of vaso-motor symptoms. The whole subject of spinal diagnosis is summed up as follows :—

> "First endeavour to ascertain the exact seat of the lesion ; note how far the several conducting functions of the cord are impaired, and the highest level of their impairment; then ascertain the condition of the central functions, especially muscular nutrition and irritability and reflex action, first in the part below the level at which conduction is impaired, and secondly at the supposed level of the lesion ; and in this way you may infer, without much difficulty, what is the extent of the lesion transversely and vertically. In the next place endeavour to ascertain its nature by considering—first, how the symptoms came on and developed ; secondly, which of the lesions having this mode of onset and development occur in the region affected ; and, thirdly, which of them are produced by the cause or causes to which the disease is apparently due."

The remarks on nomenclature are worthy of attention. If we wish to obtain clear ideas, he tells us very truly, that it is essential to use terms, where we can, which shall be pathological, and which shall be at once simple and descriptive. We must avoid the error of striving after extreme brevity. We must endeavour to substitute the idea of morbid processes for that of definite diseases.

> "A simple and convenient system of terminology lies close to hand. We have in the spinal cord the two cornua of gray matter and the three columns, lateral, anterior, and posterior. In each of these situations the various morbid processes already described may occur, and we have only to combine the terms indicating the place and the lesion to have a system of terminology already partly in use, which will altogether suffice for our present needs. Thus we may have a columnal or a cornual myelitis, hemorrhage, sclerosis, degeneration, or growth. We may have, for instance, an 'anterior cornual myelitis,' or, for shortness (since we cannot yet diagnose posterior cornual diseases) a 'cornual myelitis;' or we may have a cornual degeneration."

Useful illustrations are scattered through the book. On page 5 is given a diagram showing the average relations of the spines to the bodies of the vertebræ, and of both to the origins of the spinal nerves ; on page 52 another, exhibiting the approximate relation to the spinal nerves of the various motor, sensory, and reflex functions of the spinal cord. These will be found of great assistance when trying to localize exactly a spinal lesion. The diagram on page 38, showing the probable plan of the centre for micturition, is helpful to an understanding of the paralytic affections of the bladder. At the end of the book an excellent coloured plate is given. It comprises ten figures representing some of the more important lesions of the spinal cord, and, with one exception, drawn from actual sections.

We can commend most heartily this small but valuable book from the pen of one of the ablest and most industrious of English neurologists.

C. K. M.

Art. XXVII.—*Health Reports.*

1. *Second Annual Report of the Health Commissioner of Milwaukee (Thirteenth Annual Report of the Department)*, January, 1880. Pp. 325.
2. *Annual Report of the Board of Health of the City of Pittsburg, for the year* 1878. Pp. 86. Pittsburg, 1879.
3. *First Annual Report of the Board of Health of the Taxing District of Shelby County (City of Memphis), for the year* 1879. By G. B. Thornton, M.D., President. Published by the Citizens' Auxiliary Sanitary Association. Pp. 55. Memphis, Tenn., 1880.
4. *Second Annual Report of the State Board of Health of Connecticut for* 1879, *with the Registration Report*, 1878. Pp. 121, pp. 84. Hartford, 1880.
5. *Seventh Annual Report of the Secretary of the State Board of Health of the State of Michigan for the fiscal year ending September* 30, 1879. 8vo. pp. lxiv. 548. Lansing, 1880.
6. *Second Annual Report of the State Board of Health of the State of Rhode Island for the year ending December* 31, 1879. 8vo. pp. 314. Providence, 1880.
7. *Eleventh Report of the State Board of Health of Massachusetts for the six months ending June* 30, 1879. 8vo. pp. 184. Boston, 1879.
8. *Eighth Annual Report of the Board of Health of the City of Boston for the Financial year* 1879–80. 8vo. pp. 120. Boston, 1880.

1. The *Report of the Health Commissioner of Milwaukee* is an excellent document, calculated to contribute largely to that popular education in regard to public hygiene which it correctly recognizes in the words of Lord Derby as the only sound basis for sanitary legislative action. It is made up of the usual variety of papers and reports, many of which are worthy of notice, but want of space permits us only to refer to the following :—

Dr. Wight's article on "Sanitary Legislation as the Basis of Sanitary Administration," derives additional value and importance from the fact that the writer combines the professions of physician and attorney-at-law, and is, therefore, peculiarly qualified for rendering opinions upon the many difficult questions of legal hygiene. Our author first argues in favour of the value of public sanitation from an economic point of view, urging that the 200,000 (Dr. Billings says 300,000) preventable deaths annually in the United States, represent an annual public loss of $200,000.000, while ten per cent. of this sum would defray the expense of carrying out a complete system of sanitation for the whole country. With a few exceptions, we are far behind Great Britain in the translation of sanitary science into law. There, special Acts of Parliament, and in particular the Public Health Act of 1875, have gained for the English people the practical benefits of legal enactments guided by true hygienic science. Dr. Wight then advocates the establishment of a health department of the national government, to be presided over by a secretary of public hygiene, who should be a cabinet officer. The bureaus of this department would be seven in number, viz., National Quarantine, Maritime Quarantine, Military Hygiene, Hygiene of Commerce, National Laboratory, Hygiene of National Buildings, Investigation of Epidemic Diseases of Men and Animals.

In regard to the danger of conflict between Federal and State authority, Dr. Wight contends that every port at which an infected ship may arrive belongs to the nation, so that New Orleans, for instance, is a port of the entire country and not of Louisiana alone. Hence, while it may not "be constitutional for the general government to say to a State that it shall not have a quarantine system, the general government has a right to establish its own quarantine at any point which is in relation with the country at large and with foreign nations. Our author further asserts that the Federal government has full power to regulate, restrain, and prohibit the movement of infected persons, merchandise, etc., from one State to another, and has already exercised this power by the Act of March 3, 1873, "to prevent cruelty to animals while in transit by railroad or other means of transportation within the United States." Several good suggestions are urged in this article, among others the publication of a Weekly Health Bulletin, similar to, but on a more extended scale than, that so ably begun by our National Board of Health.

A second important paper is that upon the "River Nuisance of Milwaukee" during the past year, in which is described the progress made towards remedying the natural difficulties under which the city labours in attempting to secure a pure water supply and prompt disposal of sewage. After prolonged investigation of the subject with the aid of such sanitary engineers as Mr. George E. Waring, Dr. Wight recommends a separate system of small sewers (90 miles in aggregate length) only for the conveyance of sewage, which is to be got rid of by pumping it high enough to secure its outflow through tunnels at a considerable distance from the city. Should this plan be adopted it could probably be economically combined with some modification of the sewage farm, operated so successfully at Paris and in several British towns; and the experiment upon so large a scale will doubtless be watched with much interest by American sanitarians.

2. The health officer of the *City of Pittsburg*, Dr. Crosby Grey, commences his report with regrets over the want of success met with in their efforts to secure the co-operation and support of the municipal authorities. As a consequence, the sanitary condition has not compared favourably with that of former years, nor yet with many other and less favoured cities, although some improvement was manifest over the year 1877, when the deaths from all causes were 3408, an excess of 360 over 1878. The death-rate was 21.16 per 1000. The unsanitary condition was principally shown by the continued prevalence of smallpox in the first six months, and of diphtheria in the latter half of the year.

The cause of the continued prevalence of smallpox was, of course, the neglect of vaccination, this neglect being due to ignorance of its value, carelessness, and last, though not least, poverty. The inauguration of a system of gratuitous vaccination, by which 1512 children were vaccinated during April, May, and part of June, at a cost to the city of $1194.25, was followed by a rapid decrease of the death-rate from variola, so that from July to December, 1878, only 11 deaths occurred from smallpox, whilst it numbered 102 victims in the earlier half of the year.

The epidemic of diphtheria was unusually prolonged and fatal, causing 483, or nearly 16 per cent. of all the deaths, and terminating the existence of nearly twice as many individuals as did phthisis, which, generally, in our latitude, heads the list of mortal complaints.

According to the interesting report, with map, of Dr. W. Snively (Appendix, p. 62), this outbreak of diphtheria was characterized by a remarkable suddenness and restriction to a particular locality, in which, during the month of August, 1877, 43 deaths (estimated to represent over 200 cases) from diphtheria occurred. An invasion, so sudden and destructive, chiefly restricted to a comparatively small district of about ninety acres on the south side of the Monongahela River, seemed, of course, to point to some local cause, and on investigation strongly presumptive evidence was found that in the sewers, and especially in the one traversing Washington Street, in which a mass of filth from one to three feet in depth had accumulated, the specific poison of diphtheria had found a suitable *nidus* for its development or multiplication.

A reference to the valuable map, upon which the sewers are marked in red lines, and the location of fatal cases by red dots, supports this view, which is further in exact accordance with the conclusions of Dr. Thursfield, in regard to sewers and diphtheria reported in the *British Medical Journal* for 1878.

Dr. Snively asserts that the Washington Street sewer is the oldest and most dangerous in the city.

> "Designed originally for the purpose of draining a swamp, at a date when that portion of the city was sparsely populated, it was probably never intended by its original projectors to serve in any other capacity than as a simple drain. It has, however, been diverted from its primary purpose to meet the requirements of a dense population. The refuse and excrementitious matter from hundreds of dwellings having been directed into it, contaminates and poisons the atmosphere in a vain attempt to find its way to the Monongahela River."

We trust the health authorities will promptly comply with Dr. Snively's judicious advice either to abolish this sewer, replace it with better work, or restore it to its original function of a drain.

3. Dr. G. B. Thornton, president of the *Board of Health of the Taxing District of Shelby County*, gives us, in his report, an interesting account of the courageous efforts made, with the assistance of the National Health Board, to control the renewed epidemic of yellow fever which broke out in July, 1879. According to the mortuary report, the total number of deaths from yellow fever was 497, but as 11 deaths from intermittent fever are recorded in July, whilst none are attributed to intermittent in any other month, or during the whole of 1878, these as well some of the deaths from remittent, etc., should doubtless swell the list of victims of yellow fever to about 520. The total number of cases as given on p. 50 was 1541, of whom 860 were white, and 681 coloured, the death-rate among the former was 45.5, and among the latter 15.5 per cent.

The exceptional severity of this recrudescence of yellow fever in "ill-fated Memphis," has, of course, been supposed by sanitarians everywhere to indicate some exceptional neglect of hygiene, but we presume few students of sanitary science were fully prepared for the instructive lesson taught us by this report in regard to the general danger to health from drinking water contaminated with sewage. According to the careful analyses of Dr. Charles Smart, U. S. A., the admirable appointee of the National Health Board, out of the 4744 cisterns and wells in use in Memphis, 570 contain dangerous water, 950 are suspicious, 1896 are probably sound, and only 1328, or about 31 per cent. are absolutely safe, and contain pure water. The source of this wholesale pollution of the water supply is told in the following extract from Dr. Riley's report to the National Board of Health (pp. 10–11).

The sub-surface privy-vaults in use January, 1880, numbered nearly 6000.

> "These varied from mere shallow pits without any lining, to bricked vaults of forty feet and upward in depth. Considerably less than one-third were sufficiently remote from living rooms, while the remainder were placed at all degrees of proximity, even to being as already stated grouped in cellars. Of the total number, 3688 were in a foul condition. The extent of the soil pollution from this source may be better inferred when it is understood that the above figures do not include a large (probably equal) number of disused (but unemptied) vaults, the contents of which were only imperfectly covered by a shallow layer of ashes or refuse."

Of the 4744 cisterns and wells of the city 3508 are within contaminating distance of the known localities of these vaults! Well may Dr. Thornton remark "that it [Memphis] has escaped destruction by epidemic disease is perhaps attributable more to good fortune until recently, than to well-directed effort toward prevention."

Fortunately, an earnest and systematic effort has been made during the past winter and spring to enforce, as far as possible, the emptying, disinfecting, and filling up of all privy vaults, and the substitution of earth closets or well-arranged water closets, the establishment of a complete system of sewerage and subsoil drainage, a discontinuance of the use of cisterns and wells containing impure water, etc., which will, when accomplished, doubtless secure for the city a comparative immunity from epidemic disease.

4. Dr. C. W. Chamberlin, secretary of the *Connecticut State Board of Health*, reports that efforts have been made to examine suspected sources of water supply in various parts of the State, whenever circumstances warrant, on due notice being given, and we think if this project is fully carried out, a large amount of preventable disease will be avoided. In order to bring the subject of the vital importance of pure water and good drainage clearly before the popular mind, an excellent little tract, entitled "Suggestions on Rural Hygiene relating principally to the House and its Surroundings," a copy of which is contained in the report, has been widely circulated. This pamphlet has the immense advantage of being illustrated with some highly suggestive woodcuts, which are likely to arouse thousands of persons, who, otherwise, might not read the text, to a sense of the risk they daily run in drinking contaminated water, and breathing air polluted with gas from cesspools and from drains.

In regard to disinfectants, the admirable instructions issued by our National Board of Health are reprinted and justly indorsed.

A large part of the volume is occupied with reports of special committees on the sewerage of inland cities, pollution of streams, etc., of chiefly local interest, but a brief article from data furnished by Dr. O. Brown, of Washington, Litchfield County, on sickness from impure ice, calls attention to a source of danger to health, which, in view of the failure of our usual abundant supply of ice from large rivers in this latitude, is worthy of special notice at the present time. In this instance six persons out of a family of seven were attacked with diarrhœa and dysentery (which proved fatal in three of the cases) apparently from using ice collected the previous winter from a stream, the water of which was contaminated by the excrement of pigs, and perhaps by soakage from the privy vault. The water from this melted ice had a greenish colour, with organic particles in suspension, and was shown on analysis to contain nearly one part of free ammonia and one of albuminoid ammonia per million.

Prof. C. A. Lindsley, of Yale College, contributes a good paper on Sanitary and Unsanitary Conditions of Soil, and the Secretary furnishes a valuable illustrated article upon School Hygiene, which, however, should not have been allowed to instruct teachers and school boards that the best light is that which comes from behind the pupils (p. 119).

5. The first sixty-four pages of the Michigan volume are occupied by the report of the able and efficient Secretary, Dr. Henry B. Baker, of Lansing, giving in detail a relation of the work of the Board in collecting statistics and disseminating information upon sanitary subjects.

Among the numerous valuable papers which constitute the bulk of the work, the annual address of the President, Dr. Robert C. Kedzie, "on the Inspection of illuminating oil in Michigan," and his report on "public Health Meetings;" Dr. Homer A. Hitchcock's essays upon "Privies and Water-closets at Railway Stations," on "Slaughter-houses, Rendering Establishments, etc.," and on "Epidemic, Endemic, and Contagious Diseases;" Hon. Leroy Parker's reports "on the Regulation of Medical Practice," and upon "the Powers and Duties of local Boards of Health," and Dr. Henry F. Lyster's article on "the Reclaiming of Drowned Lands;" are worthy of extended notice did space permit.

Besides the vast amount of routine work performed by Dr. Baker as Secretary, he has found time to furnish a report upon "Glanders in Man and the Domestic Animals," which urges a much needed attention to the study of these hitherto comparatively neglected sources of human suffering and death. Two horrible cases of fatal acute glanders, which occurred in the State of Michigan during 1879, are detailed, and lamentably confirm the opinion quoted from a London police magistrate "that a glandered horse was more dangerous than a mad dog, and it was perfectly monstrous that this loathsome disease should have been allowed to exist in the number of cases now brought to notice with all the risks which each one entailed upon the community at large." Dr. Baker gives in this essay a valuable monograph on the symptoms, causation, treatment, and prevention of glanders, chiefly compiled from Prof. Bollinger's article in Ziemssen's Cyclopædia, vol. iii. p. 349 *et seq.*, and the Report on Glanders by Dr. H. J. Detmers, V. S., Special Report No. 12, U. S. Department of Agriculture Report, 1879.

6. The Second Annual Report of the Rhode Island Health Board is chiefly occupied by the various records of the Secretary in regard to the work of the board, vital statistics, acute disease in the towns, cattle commission, etc. It also contains an admirable essay on the Artificial Feeding of Infants (to which the Trustees of the Fiske Prize Fund awarded their premium of $200 in June of last year), and shorter articles on ventilation of school-houses, sewerage of the dwelling, disposal of excreta, and colour-blindness, all well calculated to popularize important sanitary knowledge respecting the approved measures for avoiding disease and death.

7. This concluding report of the Massachusetts Health Board gives an interesting *résumé* of the work of the six months which preceded its con-

solidation with the Boards of Charity and Lunacy. The volume contains a general index for the entire series, which forms a most creditable and valuable addition to the literature of hygiene.

8. The Eighth Report of the Boston Board of Health contains the usual records of sanitary effort, which are of chiefly local importance, but the account of attempts to determine the amount of sewage contamination in the mud of the flats which so extensively surround the Athens of America, and threaten to render its vicinage almost a second Campagna in unhealthfulness, is of more general interest. From the investigations of Prof. W. Ripley Nichols upon numerous specimens of mud from different localities, he concludes that "the connection between the discharge of the sewage and the offensiveness of the Charles River and other flats is a most intimate one,—namely, that of cause and effect." Another improvement much needed in all large cities is the establishment of public urinals similar to those upon the Paris boulevards, which in spite of illiberal opposition is reported to have been partially successful in Boston, where seven new ones (making twenty-two in all), have been erected during the past year. J. G. R.

ART. XXVIII.—*Cholera Epidemics in Japan, with a Monograph on the Influence of the Habits and Customs of Races on the Prevalence of Cholera.* By D. B. SIMMONS, M.D., Physician and Surgeon to the Ken Hospital, one of the Physicians to the Cholera Lazaretto, and Chairman of the Yokohama Foreign Board of Health. 4to. pp. 30. Shanghai: printed at the Statistical Department of the Inspectorate-General of Customs, 1880.

THIS interesting account of cholera in Japan is chiefly valuable on account of the remarks in regard to the influence of national habits upon the spread of cholera, its historical portion being largely made up of the facts described in the essay of Dr. Nagayo Sensai, reviewed in the July number of this Journal.

According to Dr. Simmons, the cause of the devastating epidemics of cholera in India is to be discovered in the circumstance that a Hindu cannot be made to use a latrine, and hence deposits his excrement in shallow holes and on the surface of the ground, whence it is either carried into the drinking-water, or drying, is disseminated through the air as dust, *before putrefactive fermentation has a chance to destroy the specific cholera germ.* The immunity from cholera outbreaks enjoyed by China, he attributes to the custom of hoarding human excreta as manure, and its consequent prompt removal in earthen or wooden vessels in such a way as to prevent contamination of the water supply. A further safeguard is found in the Chinese habit of always, if possible, boiling water before drinking it, even if it is not used for making some kind of tea. The occasional prevalence of cholera in Japan is attributed by Dr. Simmons to the practice of preserving human fecal matters (which are highly valued as fertilizers) in wooden receptacles, sunk in the ground under the house, or in its immediate neighbourhood, and from which leakage or overflow is apt to occur, and contaminate the drinking-water.

Should further observation and research confirm Dr. Simmons's opinion of the universality of these customs and of their causal relation to prevalence of, or immunity from, cholera epidemics, we will gladly welcome his deductions as valuable contributions to that comprehensive study of the sociological department of biology in its relations to preventive medicine, which is destined to play so important a part during the next century in the improvement of our race. J. G. R.

ART. XXIX.—*Ueber die respiratorischen Aenderung des percussionsschalles am Thorax unter normalen und pathologischen Verhältnissen*, von Prof. Dr. N. FRIEDREICH, in Heidelberg. *Deutsches Archiv für Kilinische Medicin.* Bd. xxvi. 1 u. 2 Heft. pp. 24–83.

Respiratory Percussion. By Professor N. FRIEDREICH, of Heidelberg.

AFTER a full discussion of the causes of the sounds obtained by percussion of the chest, Prof. Friedreich proceeds to consider the changes in quality and intensity which these undergo when the chest is percussed at different times during the respiratory act. In ordinary breathing there is little or no difference, he says, in the sounds yielded during inspiration and expiration, except that in consequence of the distension of the lungs during the former act, a clear sound will be obtained over a greater extent of surface than during the latter. He admits, however, that in very young persons there is occasionally a slight difference in the sounds, especially when the front of the chest is percussed.

If, however, percussion be performed during ordinary respiration and then towards the end of a full inspiration, or while the chest is still distended from it, a decided difference in the sounds obtained will be distinctly perceived, especially when certain portions of the chest are under examination, as, for instance, the upper part of the right side down to the fourth rib in front, to the fifth laterally, and to the seventh posteriorly. On the left it is, in consequence of the presence of the heart, only detected in the infra-clavicular region. In other words, it is most apparent over those parts of the normal chest which, during ordinary respiration, give the fullest and loudest sounds, and which admit of the greatest expansion, and is consequently most noticeable in young persons. This modification of the percussion sound, which he proposes to call *regressiven inspiratorischen Schallwechsel*, consists principally in an elevation of pitch and in a diminution of intensity and duration. In this it will be seen he differs materially from Dr. Da Costa, who holds that "a full-held inspiration increases the resonance, makes the sound fuller, and raises the pitch."[1] The author attributes the elevation of pitch to the condition of extreme tension of the thoracic walls, and of the lungs and pleura, which is induced by a full inspiration, and which counterbalances the influence of the increased quantity of air in the chest, which alone would have the contrary effect. The tension of the walls of the thorax acts by diminishing their flexibility and elasticity and by preventing, to a certain extent, the transmission of the vibrations caused by the blows upon the chest to the lungs within. Hence the amount of lung made to vibrate is less than under ordinary circumstances. By a series of experiments through which it is impossible to follow him. Prof. Friedreich demonstrates that the amount of lung usually set in vibration is five centimetres in depth and about two centimetres in width.

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[1] See article on "Respiratory Percussion," Amer. Journ. Med. Sci., July, 1875.

Occasionally, at the end of the fullest possible inspiration, the author has noticed that the intensity of the sound again undergoes an increase, while its pitch is lowered ; but it never attains the degree of fulness it had at the beginning of the inspiratory movement.

Very different from this modification of the percussion note is that which is obtained during full-held inspiration over those portions of the thorax, in which, during ordinary respiration, we have the relative dulness of the liver and heart, or in those positions in which the shelving borders of the lungs overlie these organs. On the right side the full sound passes into relative dulness in front at the fifth rib and extends three centimetres ; on the side, at the sixth, and extends the same distance ; on the back, at the right, and extends four centimetres. Within this region of relative dulness, and also within that surrounding the heart, the percussion sound during a full-held inspiration is lower in pitch, louder and fuller than during ordinary respiration. In fact, it resembles more or less closely the sound which is usually obtained over the infra-clavicular regions. This modification of the percussion sound Prof. Friedreich proposes to distinguish as the *progressiven inspiratorischen Schallwechsel*, and is of course due to the increase of volume given to the lungs in these positions by full inspiration. The lung is, in these regions of relative dulness, less than five centimetres in thickness, and hence the vibrations caused by percussion are, during calm breathing, arrested before they have penetrated to the depth which the author has shown they are capable of doing in other parts of the lungs. The sound yielded will therefore have the characters of that known as relative dulness. A full-held respiration will, by increasing the thickness of the lungs in these positions, render the sound louder and lower in pitch.

We must of course, as the author points out, be careful to distinguish from the above-described modification of sound that which is obtained over those uncovered portions of the liver and heart nearest the borders of the lungs. The sound yielded in these positions, even during ordinary inspiration, is, in consequence of the extension of the lungs downwards and laterally, less dull than during expiration, and this difference is of course much increased when a deep inspiration is taken. It is hardly necessary to add that this modification will not be perceived if adhesions prevent this extension of the lungs. These will not, however, affect the progressive inspiratory modification of sounds within the limits of relative dulness, as they cannot prevent the expansion of the lungs.

Between the regions of regressive and progressive sound modification there is a region to which the author gives the name of neutral zone, within which every indication of a modification of the percussion sound during a full-held inspiration is absolutely wanting. On the right side this zone extends in the mammillary line from the fourth to the fifth rib inclusive ; in the mid-axillary line from the fifth to the sixth rib, and posteriorly from the seventh to the eighth rib ; on the left side, the existence of a neutral zone, with very much the same boundaries, may also be recognized ; but in consequence of the proximity of the stomach, it is much more difficult to demonstrate. It will be at once perceived that the upper part of this zone is on the same level as that usually assigned by authors to the convex surface of the right lobe of the liver, and that the zone itself is just above the region of relative hepatic dulness, the upper part of which corresponds to that portion of the shelving border of the lung which is under five centimetres in thickness, the distance to which vibrations caused by the percussion stroke are believed by the author to penetrate. This absence of all change in the percussion sound during inspiration is attributable, in his opinion, to the exact counterbalancing of the effects of an augmented thickness of lung by those of increased tension of the chest-walls and other parts. A neutral zone in the præcordial region of from one and a half to two centimetres in width may also be distinctly made out.

The author next considers the changes in the percussion sound produced by the fullest possible expiration. He cannot agree with Dr. Da Costa in his assertion that during expiration the sound is diminished in intensity and lowered in pitch over the upper part of the chest, since the fullest possible expiration will not diminish the thickness of the lung in this region to a sufficient extent to produce any decided alteration in the character of the sound, or produce such a difference in the condition of tension of the chest-walls and lungs as would have any marked influence upon it.

It is different, however, within the limits of the neutral zone, which the author says only deserves its name in consequence of its behaviour during full inspiration. On the other hand, during full expiration this region yields a sound on percussion which is less intense and higher in pitch than that obtained during ordinary breathing. The cause of this modification of sound he believes to be due to diminished thickness of the lungs, which occurs as a consequence of the elevation of the diaphragm and the retraction of the walls of the chest. Still more marked is this *regressiven expiratorischen Schallwechsel* within the limits of relative liver dulness. Here, where, in consequence of only a thin layer being under the percussing finger, the sound is dull even in ordinary respiration, it becomes, under the influence of a full expiration, duller, shorter in duration, less intense and higher in pitch. In fact, at the lower border of this region, as a result of the recession of the lungs, the sound becomes absolutely dull. The same modification of the percussion sound during full expiration will be readily recognized in the region of relative cardiac dulness.

Very different results are obtained by respiratory percussion in disease from those observed in health. In emphysema, for instance, it is difficult to detect in advanced cases any modification of the percussion sound during full inspiration. In light cases it may still be perceived, but much less distinctly than in health. In the latter the change in the sound may be more marked in certain positions than in others—an indication that the disease is local in character. Occasionally, but rarely, the author has observed that the sound becomes more intense and lower in pitch during a full-held respiration than during ordinary breathing, undergoing, in other words, a progressive instead of a regressive modification as in health. The cause of the diminution or absence of any change of the percussion-sound during inspiration in emphysema is due to the fact that the already over-distended chest is capable of but little further expansion, and the effects of the slightly increased tension of the walls of the chest are exactly neutralized by those of the larger amount of air admitted into the lungs. Indeed the latter will sometimes more than counterbalance the former, in which case we have the progressive modification of the sound above referred to.

On the other hand, in asthma when uncomplicated by emphysema, the changes in the percussion sound during inspiration are in consequence of increased expansion of the chest more distinctly perceived than in health. The knowledge of this fact may sometimes be of use to us in diagnosis by enabling us to exclude emphysema from consideration. The author has observed the persistence of this modification in cases of the following diseases in which dyspnœa was a prominent symptom: one, hysteria; two, fatty degeneration of the heart; three, uræmic asthma; four, acute miliary tuberculosis of the lungs; five, spasm of the bronchial tubes.

In pneumonia, in those cases which have come under his observation, when the disease affected the lower lobe of the lung, the author failed to recognize, so long as hepatization continued, any modification of the percussion sound during full inspiration. In the stage of resolution, however, he was able to demonstrate that the sound, which then acquires a certain degree of clearness and occasionally a tympanitic quality, becomes, during a full-held respiration, shorter in duration and higher in pitch, and at the same time loses its tympanitic character. More rarely the sound undergoes the opposite modification, and while losing its tympanitic quality becomes lower in pitch and louder. In pneumonia of the apex the results of percussion are different. If the infra-clavicular region is percussed in these cases, especially towards its centre, a tympanitic sound will be obtained, even during the continuance of hepatization. This sound, it is generally admitted, is due to the vibrations of the air in the trachea, the solidified lung forming an excellent conducting medium. During a full-held inspiration its pitch is raised, but it does not lose its clearness or tympanitic quality. The author admits, however, that this modification of the percussion sound is not perceived in all cases. He attributes it to the widening of the chink of the glottis which occurs during inspiration.

The modifications of sound furnished by respiratory percussion in pleurisy are very numerous, and differ with the stage of the disease, the quantity of the effusion, and the condition of the muscles of respiration. If the effusion be moderate in amount percussion of the infra-clavicular region of the side affected will yield a tympanitic sound, but if it be practised several times during a full but slowly drawn inspiration, the sound will be found to vary with the degree of expansion of the chest, being at first lower in pitch, and less tympanitic than during ordinary breathing, and then becoming shorter and higher in pitch. In other words, there is a double modification of the sound; the change being, to use the author's expressions, at first progressive and later regressive in character. Occasionally, however, the intermediate stage is wanting, and the sound acquires immediately after the beginning of the inspiratory movement the characters of that described above as obtained when the chest is freely expanded. On the other hand, the author refers to a case in which the sound continued low in pitch during the whole of the movement of inspiration. This was probably owing, he says, to a loss of power on the part of the inspiratory muscles, which prevented the full dilatation of the chest. Under these circumstances the chest walls do not attain the degree of tension necessary to produce a high pitched sound. The same modifications of the percussion sound are sometimes observed upon the sound side in cases in which the effusion completely fills one pleural cavity, but are less marked. Under the clavicles of the affected side percussion frequently yields in these cases a tympanitic sound which has the same origin as that which is heard in pneumonia of the apex, and undergoes the same modification during inspiration. In all parts of the chest in which the percussion sound is absolutely dull during ordinary breathing, no change is produced in it by the fullest possible inspiration.

In cases in which the effusion is moderate in quantity the lines of dulness will be lowered during full inspiration, especially if the diaphragm retains its contractility. This is, however, not positively essential to this result, since the enlargement of the chest caused by the other muscles of respiration is sufficient to cause a decided sinking of the fluid. Adhesions, provided the lung is capable of expansion, do not prevent the occurrence of this change. Occasionally, however, the level of the liquid is found to have risen after a full inspiration. This will occur in those cases in which the lungs are incapable of further expansion, and in which the diaphragm retains its contractility, although pressed down into the abdomen so as to present a convex surface below. Its contraction would, under these circumstances, diminish the long diameter of the pleural cavity, and thus cause a decided elevation of the effusion. The same result would also be brought about, in cases in which the diaphragm was paralyzed, but in a much less marked degree, by the action of the abdominal muscles forcing this muscle up, provided, of course, that the other muscles of respiration retained their activity sufficiently to produce some dilatation of the chest.

If, as the result of a pleuritic process, an obliteration of the mediastino-costal and the phrenico-costal sinuses has occurred, it is evident that the deepest inspiration will produce no change in the extent of the absolute cardiac and hepatic dulness. On the other hand, the inspiratory modification of the percussion sound within the limits of the relative dulness of these organs will not be affected by these adhesions, as, while the latter prevents the extension of the borders of the lungs laterally or downwards, they do not interfere with their expansion. They do, however, present an insuperable obstacle to their retraction, and consequently hinder the occurrence in these positions of that change of the percussion sound which is usually observed after a prolonged expiratory effort, and which the author calls *regressive expiratory sound modification.*

The few cases of pneumothorax which the author has had the opportunity of examining by respiratory percussion, and which all occurred in the subjects of phthisis, presented the same phenomena. The sound yielded by percussion during expiration was loud, low in pitch, and more or less tympanitic in quality; when, however, a full inspiration was taken it lost its tympanitic character and became shorter and higher in pitch—a change which can only be attributed to the increased tension of the chest-walls.

In phthisis, the results of respiratory percussion vary with the stage of the disease. When there is induration only, the percussion sound during calm breathing is duller than in health, and has occasionally more or less of a tympanitic quality. After a full inspiration its intensity and duration diminish, while its pitch is raised, and its tympanitic quality, if this were present before, is lost. The same regressive modification of the sound is observed, therefore, as in health, but it is much less marked. Indeed, if the induration of the lung is excessive, there may be little or no difference in character between the sounds obtained at the beginning and at the close of a full inspiration. When the disease has advanced to the stage of excavation, and the cavity is superficially seated and surrounded by thin membranous walls, a full inspiration will render the previously clear and tympanitic sound dull and higher in pitch, and diminish, if it does not destroy its tympanitic character, as has already been pointed out by Drs. Da Costa and Wintrich. A prolonged expiration will, on the other hand, restore the tympanitic quality to the sound. This modification of the sound is also perceived when the cavities are more deeply seated and surrounded by indurated walls, but is less distinct.

The cracked-pot sound is usually best heard when percussion is performed during expiration. Nevertheless, the author has met with a case in which it was only obtained during inspiration. J. H. H.

ART. XXX.—*Transactions of The American Gynæcological Society, Vol. IV., for the year* 1879. 8vo. pp. 506. Boston: Houghton, Mifflin & Co., 1880.

THE fourth annual meeting of this Society was held in Baltimore, on September 17, 18, and 19, 1879, with thirty-three out of the forty-nine Fellows in attendance; Dr. T. Gaillard Thomas presiding.

Dr. JAMES P. WHITE, of Buffalo, read a paper entitled *Hints Relative to Intra-uterine Medication.* As gynæcologists are by no means of the same opinion in regard to the question at issue, the views of the author provoked a long and animated discussion, in which well-known authors expressed directly opposite views. Although Dr. White does not recommend injecting the uterus with medicinal agents, on account of its dangers, he advocates the application of fluids in small quantities to the lining membrane of the uterus after dilatation of the cervix; and this he effects by the use of a hollow glass sound arranged as a pipette, the liquid being expelled drop by drop, by pressing the rubber bulb. In dilating the cervix, he recommends that the sponge should be transfixed lengthwise with wire or cord so as to secure the tent from being torn into two portions in the act of removal. He also practices scarifying the lining of the cervix before the tent is introduced. Dr. White is also accustomed to treating the endometrium with solid nitrate of silver, using a rubber tube porte-caustic for the purpose. He recommends as a curette the instrument of Récamier.

As a fellow to this monograph, Dr. BATTEY, of Rome, Georgia, read one upon *Intra-uterine Medication by Iodized Phenol*, and the two papers were discussed together. Dr. Battey uses a preparation consisting generally of two parts by weight of iodine to eight of liquefied carbolic acid, applied on cotton by means of hard rubber probes. In a record of fifteen cases, it appears that he usually applied the preparation once a week for several months, and in one instance continued it interruptedly for two and a half years.

Dr. J. Marion Sims preferred the curette, as much more rapid in the cure of hypertrophy of the utricular glands, or fungoid granulations in the cavity of the uterus. He objected to the remedy of Dr. Battey on account of its disagreeable odour, being in this only second to iodoform, which he never used. He had cured uterine catarrh in its worse form by the curette followed by the cautery of Paquelin. Dr. Isaac E. Taylor indorsed the views of Dr. Sims in regard to the use of the curette and cautery. Dr. W. T. Howard had found the iodized phenol efficient in about seven out of ten cases. He had abandoned the use of nitrate of silver for some years, as it was liable to produce contraction of the os.

Dr. Fordyce Barker regarded injections of the uterus as dangerous, except where the organ is enlarged and open, as after delivery or when containing fibroids. He did not regard the curette as applicable in the same class of cases that required internal medication. It was in some conditions useless ; and might prove also highly injurious. The agents he had found most efficient were injections of the fluid extract of ergot, extract of hamamelis, and Churchill's tincture of iodine. He had cured three cases of membranous dysmenorrhœa and sterility by dilatation of the cervix followed by the use of cones of iodoform, one being introduced every other day. In one instance this was kept up from November until February, when the patient became pregnant for the first time, after a marriage of six years.

Dr. John Byrne had injected the uterus nearly two thousand times. The tolerance of the uterus increases, as the lining membrane departs from a normal condition. When nearly healthy it is intolerant of even bland fluids. The most dangerous fluids under all circumstances are solutions of nitrate of silver and chloride of zinc. He had abandoned all liquid injections excepting that of chloride of sodium after curetting.

Dr. Paul F. Mundé did not use uterine injections. He applied liquids by Battle's hard rubber intra-uterine syringe. Although efficient, its use was not without danger, as he had seen in three instances in which uterine colic resulted. He would not be willing to introduce fluids drop by drop into the uterine cavity as recommended in the paper of Dr. White.

Dr. William Goodell was opposed to the use of the string through the sponge tent, as recommended by Dr. White, on the ground that it compressed the sponge in the direction of its length, causing its free extremity within the uterine cavity to enlarge disproportionately and thus increase the difficulty of removal. He was also opposed to the plan of incising the lining of the cervix as tending to increase the risk of absorption of septic matters. He was in the habit of stretching the cervix with a dilator introducing a sponge tent, and then packing it around with small laminaria tents, so as to attain, if possible, a full dilatation at one trial, and thus avoid a second use of tents, which is more dangerous through the abrasions already produced by the first dilatation. He advocated intra-uterine medication, and used injections in some cases, by means of Battle's syringe, to the extent of from four to eight drops, the fluid being used free, or compressed into cotton wrapped over the nozzle. He used diluted carbolic acid (Calvert's No. 4 solution), iodized phenol, and chloral hydrate. He avoided the use of injections in hysterical girls or nervous sterile women, with anteflexed womb, dysmenorrhœa, tender vagina, and perhaps irritable bladder. Dr. Goodell believes that the tenderness sometimes noticed at the internal os in the passage of a sound, is due to the existence of a fissure. Such cases have been benefited by forcible dilatation and then making an application to the painful point.

Dr. Nathan Bozeman advocated the attention being paid to uterine displacements before treatment of the uterine cavity, the disease of the uterus being often dependent upon its abnormal position. He had abandoned the dilatation of the cervix for the purpose of intra-uterine medication, relying upon the restoration of the organ to its proper position to enable the operator to make internal applications when required.

Dr. H. P. C. Wilson was in favor of intra-uterine medication. He had abandoned the use of injections ; he advocated the use of Sims's speculum, and of the vulsellum, in making applications. He was afraid of tents, and seldom used them; when he was obliged to, he wrapped the tent in goldbeater's skin before introducing it. In removing a tent he seized the cervix with forceps, drew it down, passed a probe around the tent so as to separate it from the mucous membrane; it could then be removed with very little traction.

Dr. Thaddeus A. Reamy never used sponge-tents: he employed the slippery-elm and laminaria, but never singly. Instead of one large laminaria, he generally used several small ones. He used intra-uterine medication, but preferred the wire curette in membranous dysmenorrhœa, applying it the day before menstruation, and following it immediately with one per cent. dilute carbolic acid.

Dr. T. G. Thomas gave it as his opinion "that as a rule, intra-uterine medication carried above the os internum, is often hazardous, generally disappointing in results, and in many cases very useless." He treated obstinate cervical catarrh by dilating with a *tupelo tent*; then drawing down the cervix with a tenaculum; then cutting out the diseased Nabothean follicles with Sims's curette, and finally packing the canal with iodized cotton. This, it is sometimes necessary to repeat two or three times. Dr. Thomas believes that cases requiring intra-uterine medication are very exceptional. Replacement, the curette, and constitutional treatment, with in some instances tracheloraphy, are his favourite measures.

We have given extracts from the remarks made, to indicate how much the experiences of leading gynæcologists cause them to differ as to their views and methods of treatment.

In a paper upon *The Treatment of Puerperal Septicæmia by Intra-uterine Injections*, Dr. EDWARD W. JENKS, of Chicago, advocated the cleansing of the uterine cavity after parturition in all cases where there were evidences of commencing septic infection, so as to remove all matters likely to increase the danger by absorption. He had used intra-uterine injections in sixteen cases for the treatment of puerperal disorders, all of them in private practice. The remedies were solutions of carbolic acid, and permanganate of potash, sometimes in combination, but more frequently alone, and the former the oftener of the two. Salicylic acid and quinia were given internally. Dr. Jenks used the fountain syringe for washing out the uterus, in order to avoid the risk of the introduction of air. All of the women treated had either offensive or purulent discharges, or an entire absence of the lochia. In six, fragments of the secundines were washed out. In no case were injections used before the third day, and they were continued from three to sixteen days. In all cases beneficial results were apparent, and in no one was there an accident or any serious consequence resulting.

In a paper on *Cases of Sporadic Septicæmia in Gynæcological Practice*, Dr. JAMES R. CHADWICK, of Boston, records five cases in proof of the value of washing out the uterus, all of which recovered. The fluid used was a solution of permanganate of potash. In each instance there was a marked improvement after the injections were commenced. Dr. Chadwick objected to the use of carbolic acid, as it was sometimes absorbed with poisonous effects. The permanganate combines with dead animal matter, and becomes changed in colour; when this ceases to be produced the injecting should stop for the time. The lesson he wished to inculcate was this: 1. After all processes natural or artificial leaving denuded surfaces in the cavity of the uterus there was danger of blood-poisoning; 2. That if this "be by septic matter the source of infection may be reached and rendered inert by disinfectants; 3. That if this be done early in the disease the system will not have been charged with more morbific matters than it can eliminate, and consequently that the fatal result may be thus averted."

Dr. Sinclair presented a brief summary of 20 cases of puerperal septicæmia observed in the Boston Lying-in Hospital, of which 11 recovered. Among these we notice three lacerations of the cervix; eight of the perineum; one putrid fœtus; and one gangrenous vagina.

Dr. Skeene favoured antiseptic measures, but thought these should be applied so as to prevent the occurrence of septicæmia. He thought the uterus should be freed from foreign matters at the close of labour. He believed intra-uterine douches to be dangerous, and that there were cases where they must fail to remove purulent matters, which were deep-seated in the uterine tissues: his experience led him to avoid this form of treatment.

Dr. Engelmann thought intra-uterine injections in puerperal women dangerous. He favoured their use for the disinfecting and removal of putrid remnants of the placenta, and preferred the permanganate of potash; he had seen great injury result from the absorption of carbolic acid. He believed that in some regions a malarial complication existed, indicating the use of quinia. This appeared to be the case in the Mississippi Valley, where large doses were found beneficial.

Prof. Barker regarded intra-uterine washes as valuable, but in a limited number of cases. He believed he had seen life thus saved; but in one instance it was lost he thought more by the injection than the septic poisoning. In one case in an interval of five hours he had made three injections; the temperature fell from 105.8° to 102°; pulse from 160 to 120; and respiration from 44–48, to 30; vomiting had ceased, and patient complained of hunger. These injections should never be entrusted to a nurse. He thought that veratrum viride should not be used in septicæmia.

Dr. H. P. C. Wilson, although opposed to injecting the uterus, except where fully dilated, was in the habit of doing so in septicæmia after parturition and abortion. He had not met with any unpleasant accident in consequence of it.

Dr. Goodell was opposed to the use of injections as a prophylaxis. He feared the use of the douche in septic cases, because the accoucheur was in danger of spreading the disease. In bad cases the treatment was requisite, but the physician should not attend other cases of labour at the time. He had seen a remarkable recovery result from it. Dr. Goodell lubricates his fingers with carbolized lard in cases of parturition, and has the vagina and genitals washed after the labour with a five per cent. carbolic acid solution. He also, although delivering the woman on her side, turns her on her back before delivering the placenta in order to prevent the entrance of air into the vagina and uterus.

Dr. Howard, of Baltimore, had saved three cases of septicæmia by intra-uterine injections. He employed carbolic acid, first dissolved in glycerine (℥ss to f℥iv), and then diluted with water (f℥ss to from f℥xij to f℥xvi). He also used hypodermically the hydrobromate of quinia. Dr. Trask was in favour of intra-uterine injections in septicæmia, and recommended Dr. Chamberlain's glass tube to be introduced so as not to soil the fingers of the accoucheur. Dr. Erich, of Baltimore, used ergot hypodermically, antiseptic uterine injections, and vaginal suppositories of boracic acid every four to six hours.

Dr. T. G. Thomas was decidedly in favour of injections being used at once in cases where symptoms indicative of septic infection appeared. He had seen the temperature thus reduced from 107° to 101° or 102° Fahr. in a short time. He used the glass tube of Chamberlain with a fountain syringe, carried the tube high in utero, excluded all air, and allowed the fluid to enter by gravitation. He used a new tube in every case, and had not seen any accident under the method. By the old method he had seen one death certainly, and possibly three, induced. In addition to the early use of warm carbolized water in this way, Dr. Thomas reduces the temperature to 99° or 100° by cold affusion, uses opium moderately to relieve pain, and administers salycilic acid and quinia.

Dr. SAMUEL C. BUSEY, of Washington, D. C., contributed an article of twenty-two pages on *The Pathology of the Cicatrices of Pregnancy*, referring to the red or white shining striæ on the skin of the abdomen, mammæ, anterior and inner surfaces of the thighs, and sometimes of the buttocks of pregnant and multiparous women. The paper shows great research upon a subject about which little has been written. There was no discussion.

In a paper on *Prolapse of the Ovaries* Dr. PAUL F. MUNDÉ, of New York, shows that this subject has been but slightly touched upon by obstetrical writers, and claims at the same time that the cases of the disease are frequently observed in gynæcological practice. In 1860 unselected gynæcological cases he had examined the seat of the ovaries in 145, in which they were palpable; finding them normally located in 68, and in 77 prolapsed. In 53 they were of normal size; in 92 one or both were inflamed or enlarged. Of these, 139 were married, 6 single; 8 nulliparæ, 131 parous women. In 32 cases enlargedo varies were not displaced. Of 77 displacements there were both prolapsed in 12, the left in 46, and right in 19. In 17 cases the displaced ovary was normal in size and consistence; in 13, exceedingly sensitive to the touch: 3 of the 13 were young virgins. In 8 of the 60 prolapsed and enlarged ovaries the organ was immovable. In but 2 instances was an ovary prolapsed anteriorly.

In 22 cases the uterus was retroverted; in 11, retroflexed; in 5, anteflexed; in 1, anteverted; and in 5, descended. In 21 cases the cervix was lacerated. The prolapsed and enlarged ovary corresponded with the side lacerated, if torn only on one side. The enlarged and displaced ovaries were, as a rule, sensitive to the touch.

Causes.—"The ovary may become enlarged from" "normal menstrual congestion; passive or inflammatory hyperæmia; acute, or much more frequently chronic, interstitial inflammation; puerperal sub-involution; beginning cystic, fibrous, or cancerous degeneration; and early ovarian pregnancy."

Dr. Mundé inclines to the belief that increase of weight in the ovary usually precedes the descent of the organ, although it may become prolapsed without change. He also believes that the prolapsed position favors an increase of hyperæmia, and hyperæsthesia. In menstrual congestion the organ may descend, to resume its true position when the congestion disappears.

In multiparæ the relaxation of the supports favours prolapse; so also may exhaustion from hemorrhage. Sudden falls may displace an enlarged ovary; but it is questionable whether one of normal size will be thus affected. Pressure from above, in the form of tumors; fecal impaction of the descending colon; or an enlarged floating kidney, may also force down the ovary directly acted upon.

Treatment.—Replacement, if possible, in the knee-breast position, and supporting by a pessary fixed in the retro-cervical cul-de-sac, various forms being recommended, according to the peculiarity of the case; packing the cul-de-sac and vagina with disks of cotton, sheep's wool, or marine lint soaked in carbolized glycerine and squeezed dry, and introduced, one by one, to be removed and changed every twenty-four or forty-eight hours, as recommended by Taliafero and Bozeman; and the use of a soft sponge-tampon soaked in a disinfectant solution. The pessaries recommended are the Albert Smith, Thomas's bulb, Noeggerath's cradle, the flexible ring, inflated rubber ring, and ball pessaries. For medication; vaginal suppositories of iodide of lead (15 grs.), packed behind the cervix, chloride of gold and sodium (gr. $\frac{1}{20}$ to $\frac{1}{8}$), three times a day, bromide of ammonium, anodyne suppositories per rectum, and laxatives.

Dr. Goodell spoke of the pain in prolapse, as beginning when the rectum was loaded, and reaching its greatest severity in defecation; the pain of passing hardened fecal matter often continuing for several hours. He believed that sexual relations often kept up a prolonged ovarian hyperæmia, that induced prolapse; and that the displacement was more common in lean than fat women.

Dr. Bozeman thought that pressure in the knee-elbow position upon a fixed ovary, followed by the vaginal packing, would in time overcome the adhesions. He applied iodoform ointment to the cul-de-sac to relieve the hyperæsthesia, and kept it in place by a column of carbolized cotton.

Dr. Busey remarked that he had observed in his cases the presence of a localized circumscribed pain upon some part of the buttocks, and that this was excited when the prolapsed ovary was touched in making an examination.

Dr. Barker recommended the use of protiodide of mercury in cases where the prolapsed ovary was fixed by adhesions. He preferred the vaginal tampon to the pessary, and saturated it with a solution of tannin, ʒj to f℥j of water. As a laxative he preferred equal parts of sulphate of magnesia, carbonate of magnesia, tartrate of potassa, and sulphur.

Dr. Albert H. Smith had not seen good results from pessaries, although he had tried all forms. He had derived the best results from the use of a small bag of tarletan distended with tannic acid. He believed there was no relief for some extreme cases, unless it might be obtained by Battey's operation.

Mr. T. Spencer Wells, of London, Eng., reported a case of a lady of 50, operated on by him at Cannes, France, after the method of Dr. Battey, for dysmenorrhœa. The success was not perfect, as the patient continued to menstruate, and suffered pain; but her relief from violent suffering had been very marked. She says, "In 1878 I have had 39 days suffering; in 1877 I had 185." In May, 1879, she was reported as very well. Dr. Battey wrote to Mr. Wells, who agreed with him in opinion, that in all probability a small portion of ovarian tissue had not been removed. The ovaries were removed by abdominal incision.

Kolpo-Cystotomy by Galvano-Cautery is the title of a paper by John Byrne, M.D., of Brooklyn. Opening of the bladder for the cure of cystitis was first practised on a male subject by Prof. Willard Parker, of New York, nearly thirty years ago, since which time it has gradually come into repute as a means of cure in women, upon whom Dr. Byrne and others have repeatedly performed it with success, the object being to drain the bladder, give it rest, and enable the operator to wash it out by syringing.

Dr. Byrne has devised a pair of forceps, composed of a vesical or sound-blade, closing upon a vaginal or button-hole blade, with a non-conducting back. One blade enters the bladder, the other is closed upon it, and the galvano-cautery loop is passed back and forth until the parts covered by the fenestrum are burned through, when the operation is completed. Dr. Byrne has invented a small portable battery for igniting the platina wire. This appears to be a very neat operation, and secures a fistula which will usually remain open until the cure is effected.

Dr. A. D. Sinclair, of Boston, gives some *Measurements of the Uterine Cavity* in women convalescing from labour. These were taken in 108 women, delivered in the Boston Lying-in Hospital, at periods subsequent to labour, varying from 12 to 48 days. In one woman, on the twelfth day, the uterus measured by the sound but $2\frac{1}{2}$ inches; she was a primipara, and had an easy labour. The 48-day case measured 4 inches, having had severe septicæmia for 23 days. Of 41, examined in 13 and 14 days, respectively, 23 of the first and 18 of the second, there were 7 whose uteri measured $2\frac{1}{2}$ inches; 11, $2\frac{3}{4}$ in.; 10, 3 in.; 6, $3\frac{1}{4}$ in.; 2, $3\frac{3}{4}$ in.; 1, 4 in.; 1, $4\frac{1}{4}$ in.; and 1, $4\frac{1}{2}$ in.

The Early Application of the Forceps in the First Stage of Natural Labour, is the title of a paper by Dr. Isaac E. Taylor, of New York, which is a very elaborate discussion of a somewhat disputed question. The success of Dr. Johnston, of Dublin, has given his treatment a notoriety which may induce others to imitate his example. Are we prepared to give a general recommendation to the introduction of the forceps through a narrow but dilatable os uteri? Dr. Taylor uses a pair of forceps with very narrow blades, and employs them, not as compressors, or even as tractors, except in a limited sense. He keeps the fœtal head in the axis of the cervix and presses against it during a pain, but depends mainly on the uterine contractions for effecting dilatation and expelling the head. He seldom continues the use of the forceps more than fifteen or twenty minutes at a time, preferring to remove and reapply them, sometimes repeating this three or four times. He claims that in skilful hands laceration of the cervix will rarely result. He thinks that the average rate of forceps cases should be 1 in 30 to 35 deliveries. When we recommend such procedures to the profession, we must remember, that what might be comparatively safe in the hands of a Johnston or a Taylor, would be the reverse in those of the great majority of accoucheurs.

Dr. William Goodell, of Philadelphia, contributes some *Clinical Notes on the Elongations of the Cervix Uteri.* Of elongation of the supra-vaginal cervix the author gives 12 cases, treated by removal of the uterine neck by the wire écraseur. In seven instances the hot wire was used; in four the cold, and in one it is not mentioned. The results are as follows: One has remained well six years; two five years; one four years; two three years; one two years and a half; one a year and a half; one a year; and one for six months—10. One remained well four years, gave birth to a child at term, ruptured her perineum, and had her vagina and bladder again prolapsed. One was cured of the cervical prolapse, but not of the cystocele or rectocele.

Dr. Goodell favours the use of the cold wire over the hot, as after the eschar separates there is danger of secondary hemorrhage. He first cuts through the mucous membrane with scissors, then applies the wire, and finally covers in the stump by stitching the mucous edges to its rim, as directed by Hegar, of Freiburg. In cases of elongation of the infra-vaginal cervix, a less common variety, Dr. Goodell recommends amputation likewise as a means of cure.

Dr. J. C. Reeve, of Dayton, Ohio, reports *A Case of Extra-uterine Pregnancy with successful application of Electricity.* The subject was an Irish woman of 25, married six years, who had given birth to a child five years before. The extra-uterine cyst was felt behind the uterus, and measures were taken in the third month to destroy the life of the fœtus by the galvanic current, passing the same through electrodes placed in the post-cervical cul-de-sac, and upon the abdomen, by means of "the secondary current of a single cell of a galvano-faradic machine." The electricity was applied for ten minutes with considerable intensity, and repeated daily for nine days. Ten days after the last application the patient had decidedly improved; the tumour was less vascular, and mammæ less tense. In thirty days the conditions were still more marked; and in forty-six days she commenced to menstruate, the flow lasting a week. The tumour, after this, was recognized as separate and distinct from the uterus; she complained of a great deal of soreness and distress in the pelvic region; and the cyst diminished in size, becoming irregular in outline.

Dr. Reeve refers to, but does not describe, two parallel cases reported by Dr. J. G. Allen, of this city. The women were both single; one in the second and the other in the third month of pregnancy. The tumours were post-uterine, and the current was passed as in Dr. Reeve's case, but from an ordinary electro-magnetic machine. The embryos both died. Both women became sometime afterward the subjects of peritonitis, and one, still later, of pains in the pelvis and lower extremities. Both married; one is now a widow with one child, and has been well for several years; the other has not been impregnated. Dr. Allen regards the ultimate success of the cases as very complete and satisfactory.

Chronic Inversion of the Uterus is the title of a paper by Dr. W. H. Byford, of Chicago, based upon the case of a woman of 26, for whom the author replaced the organ, after fourteen months, by continued elastic pressure with a vaginal rubber water-bag. The apparatus was borne without any great inconvenience, except for a few moments after each adjustment. After the first three days she was up during part of the day, and on the seventh and eighth was about her room. Dr. Byford greatly prefers this method to the forcible one of Dr. White, of Buffalo, and has three times tried it with success. The forcible plan had failed in the case reported, and the operator sent her to Dr. Byford.

The Justo-Minor Pelvis is another title for the dwarfed, or equally contracted pelvis, and is of interest, as it may be the cause, as in the instance here reported by William T. Lusk, M.D., of New York, of a fatal dystocia. The specimen was obtained from a woman of 4 feet 11, who died in the Maternity Hospital, October 13, 1878, after a delivery by craniotomy, having been in labor thirty-seven hours. She survived the operation two and a half days. The pelvis was found to measure as follows: Conjugate, sup. strait., $3\frac{1}{6}$; transverse $4\frac{1}{2}$; oblique $3\frac{1}{2}$; inferior strait, transverse, $4\frac{1}{3}$; oblique $4\frac{1}{3}$. The fœtus weighed $6\frac{1}{4}$ pounds. After delivery the woman exhibited symptoms of severe shock, but rallied under hypodermic injections of whiskey. The lochia became offensive; sloughing was noticed about the labia on the second day extending up into the vagina; and "the patient passed into a somnolent condition with alternating periods of delirium." The delivery was accomplished in the evening of October 10, 1878, and death occurred at 7.20 A. M. of the 13th.

She was admitted eight days before delivery. The question naturally arises, would not an early Cæsarean delivery be attended with less risk to life in such cases in this country, where 75 per cent. of early operations have been successful? In Saint Catharine Hospital, Milan, four dwarfed women with contracted pelves have been saved in succession by the Porro Cæsarean method. This might be preferable in hospital service.

Dr. Lusk relates four cases similar to his own with conjugata, varying from 3 to $3\frac{1}{4}$ inches, all of which died after delivery *per vias naturales.* 1. Naegele's conjugata vera 3 in.; trans. $3\frac{7}{12}$; fœtus $5\frac{1}{2}$ lbs; delivery with forceps; died on 10th day. 2. Heim's conjugata vera $3\frac{1}{4}$; trans. $4\frac{3}{4}$; delivery by perforation and forceps; the three articulations ruptured. 3. Spiegelberg's, nearly the same; breech delivery; perforation of head; cephalotripsy; died shortly after delivery. 4. Kormann's, diameters nearly identical with those in Dr. Lusk's case; labour over three days; head adapted itself to the pelvis; child delivered alive by forceps; mother died of peritonitis. Dr. Lusk, admitting the practicability of craniotomy in these cases, believes that the Cæsarean section, or laparo-elytrotomy, would be less fatal.

In a paper on *Atresia of the Vagina, congenital or accidental, in the Pregnant or Non-pregnant Female*, Dr. ISAAC E. TAYLOR, of New York, adds three cases from his own experience, and gives a record of nine. He prefers the operation by laceration where it can be effected, particularly in the pregnant female already in labour. Of the nine cases six were congenital and three accidental; three congenital in the non-pregnant, and one in the pregnant. In the three accidental two were in the non-pregnant, and one in the pregnant. All of the cases terminated successfully. In one case operated on last year, by Dr. Taylor, the vagina was a cul-de-sac $1\frac{1}{4}$ inch deep, beyond which there was no trace of a canal. The parts were gradually separated by the finger during labor by scraping and pushing during each pain until it was made to penetrate about four inches in three-quarters of an hour. The parts subsequently dilated, the fœtus was delivered by the forceps, and at the end of a month both mother and child were perfectly well.

Premature Senile Obliteration of the Uterine Cervical Canal is the title of a paper by HENRY F. CAMPBELL, M.D., of Augusta, Ga. In the atrophic change which takes place in the uteri of women after they have ceased to menstruate, the cervix sometimes advances more rapidly than the body of the uterus, becomes much attenuated, and the canal closed, by which secretions still forming in the body of the organ are pent up, become highly offensive, the uterus enlarges, pain is produced, and relief is sought for. Dr. Campbell relates two such cases, one occurring in a single woman of 55, and the other in a multipara of 58. In both the offensive fluid was removed by opening and dilating the cervix. In the former the pelvic symptoms were removed, but she was emaciated, and broken down in health, and died in about five months after her uterus was restored to a normal condition, having never recovered from the shock and exhaustion induced by the uterine disease. In the second case cancer had been suspected before the examination; and the relief by evacuation was followed by an entire cure.

We regret that we are unable to make a more extended notice of some of the valuable papers presented before the Society, a few of which have not even been mentioned, as their character would not permit of a condensed *résumé.* We have therefore confined our remarks to the subjects which were more or less of a clinical character. R. P. H.

ART. XXXI.—*Vorträge aus dem gesammtgebiete der Augenhielkunde.* Von LUDWIG MAUTHNER, k. k. Prof. in Wien. *Viertes Heft. Prüfung des* FARBENSINNS. Pp. 179 to 262.

Examination of the Colour-sense. By LUDWIG MAUTHNER, Professor in Vienna.

THIS is, in some respects, the most interesting of the series of lectures on general ophthalmological topics which Prof. Mauthner is issuing under the above title. All of those who have written hitherto on the subject of colour-blindness have accepted in the main the Young-Helmholtz theory of the perception of colours. Mauthner takes as a basis of his reasoning on the phenomena of colour-blindness the theory of Prof. Hering, of Prague.

As these two theories differ in several important particulars, it may be well, at the risk of repeating a great deal that is already well known, to run briefly over the principal points of each.

For the perception of colours, according to the Young-Helmholtz theory, there are three separate nerve-fibres which correspond to the three so-called fundamental colours—red, green, and violet. The sum of all the sensations which the eye is capable of receiving through these three sets of nerves is white—the absence of all sensation is black.

But, while the fibre devoted to red is most strongly affected by red, it is also affected, though in a much less degree, by green, and in a very feeble degree by violet; and the green fibre is capable of being affected in a like manner by red and violet, a little more by the former than by the latter; while violet, though affected principally by that colour, is excited in a less degree by green, and feebly by red. All the other colours result from a combination of these sensations, differing according to the proportion in which they are mixed.

In accordance with this theory, then, we should not expect any material shortening of the solar spectrum when it is presented to a red or violet colour-blind individual, because the green fibre is affected, though very slightly, by both red and violet, and both the red and violet rays would produce a sensation, though it may be a feeble one.

There would always be a difference, too, to the red or violet blind, between saturated red or violet and black, because in each of those persons the red or violet fibres would be affected by the two remaining colours, and, consequently, red or violet would appear brighter; that is, more luminous than black. The confusion when it occurred would be in colours which were not saturated; that is, which contained a greater or less quantity of more than one colour.

For instance, no red colour-blind would confound saturated red and saturated green, for the green would be much the more intensely luminous. It is only in shades of red and green which are of nearly the same brightness that mistakes are liable to occur. Thus a red or green colour-blind person, according to this theory, would be likely to confound a light green and a flesh tint, of about the same brightness, or more commonly with a gray of the same brightness: for, according to the theory, the colours entering into the composition of that particular shade of green are such as make in the colour-blind eye the sensation of white reduced in intensity, that is, gray.

This theory recognizes three forms of colour-blindness, according to the particular colour-fibre which is lacking in functional activity, namely, red, green, and violet-blindness. The differential diagnosis of these three forms is made according to Holmgren by a colour which the Germans call a purple, but which corresponds to that known in our shops as Victoria rose. It is nothing more nor less than a carmine, diluted with white. When a lot of wools, containing all shades of every colour, is spread before a colour-blind individual, and he is told to select from this all those which appear to him of the same colour (lighter or darker) as the purple "sample," if he selects violets and blues he is red-blind; if green and medium grays, he is green-blind; if reds, purples, and oranges, he is violet blind.

Against this three-fibre theory Mauthner brings the following facts, based on the phenomena of colour-blindness: (1) That the red blind cannot distinguish perfectly the greens and violets, nor the green-blind the reds and violets; the only colours they can unmistakably pick out are the yellows and blues; (2) That even in a very much shortened spectrum the red-blind finds the brightest place not in the bluish-green (as we should expect), but, like the normal eye, in the yellow; (3) That very excessive shortening of the spectrum, as has been observed, sometimes extending into the orange, and even beyond it into the yellow, cannot be satisfactorily explained by this theory.

According to the theory of Hering, vision is produced by the action of light on three separate and distinct chemical substances, which he calls the *black-white*, the *red-green*, and the *blue-yellow*. Light acts on those substances by *assimilation* (*A*), and *dissimilation* (*D*).

Dissimilation of the black-white substance produces the sensation of *white*, its assimilation, *black*. As regards the red-green and blue-yellow substances, Hering is undecided as to the D- and A-colours. But if we take the red and blue as the D-colours, the dissimilation of the red-green substance would produce *red*, its assimilation *green;* and the dissimilation of the blue-yellow substance would call forth *blue*, and its regeneration *yellow*. All the rays of the solar spectrum act in a dissimilating manner on the black-white substance; that is, they produce the sensation of white, but in different degrees; the yellow acting most powerfully, the others decreasing in power towards the two ends of the spectrum. On the blue-yellow and red-green substances there are certain rays which act in a dissimilating manner, some in an assimilating manner, and some not at all. If the assimilation and dissimilation of the black-white substance are of equal intensity, the result is gray. If the assimilation and dissimilation of the red-green and blue-yellow substances are equal, the result is negative as to colour, and there only remains the dissimilating action of those colours on the black-white substance, that is white.

According to Hering, therefore, the so-called complementary colours are not complementary, but, on the contrary, antagonistic. By their mixture they do not produce white; but, being neutralized, they allow the white sensation (which they all produce in a greater or less degree) to come prominently forward.

The phenomena of colour-blindness, as based on this theory, is as follows:—

In the *achromatrope* all the rays, of whatever refrangibility, acting in a dissimilating manner, white, or its shade (gray), is produced.

In the *dichromatrope*, besides the black-white, there is only one other substance that can be acted on by the different colour rays. If this is the *blue-yellow* (constituting red-green blindness), the red, yellow, and green light act in a dissimilating manner, and the blue in an assimilating manner. The most strongly dissimilating colour is yellow ; the others are varying—sometimes the red is stronger than the green, and *vice versâ.* To some of the light waves, at the red end of the spectrum, the coloured as well as the black-white substance is insensible.

In the same way, in case of blue-yellow blindness, where there is only the red-green substance in addition to the black-white substance, the red, yellow, and blue lights act dissimilatingly, and the green assimilatingly. The D-colour is red, the A-colour green, and there are certain colour rays at the blue end of the spectrum which do not act on either one of the substances. In this case we should have a shortening of the spectrum at the blue end, as in the former case there would be a shortening at the red end.

As an assimilation and dissimilation of equal intensity of any one colour-substance would result in a total abolition of both colours, so where we have such an action in the case of a dichromatrope, there would be no colour-perception at all, but only the sensation produced by the action of the light on the black-white substance; that is, gray. It is on this account that certain shades of colour appear as gray to the dichromatrope. Purple and bluish-green are the colours which most dichromatropes confound with gray, but as the dissimilative power of any colour is not the same in all dichromatropes we should not expect to find, according to this theory, the same shades of those colours to be invariably confounded with gray. To one a certain shade would appear gray which to another would be blue, and to a third yellow, owing, of course, to the preponderating colour after the action of the opposing colours.

It will be seen that from this point of view there can be only two forms of colour-blindness, according as one or the other of the colour-substances is lacking, but as such colour-substance by its A- and D-actions represents two colours, a colour-blind individual must be either a *dichromatrope* or an *achromatrope.* Hering, therefore, recognizes only red-green blindness (or blue-yellow vision), blue-yellow blindness (or red-green vision), and achromatopsia.

All the phenomena of colour-blindness are as easily explained, and in fact some of them are more clearly understood by this theory than by that of Young-Helmholtz. It is a fact that by far the larger number of colour-blind see the solar spectrum as two colours. Even Magnus, who holds to the Young-Helmholtz theory, found, with few exceptions,[1] the red and green blind to see the spectrum as dichromatic, one of the colours being always identified as blue, and the other as yellow or red. And even in those cases where more than one colour was designated there was no unanimity as to the particular colour, so that we are perfectly justified in the inference that they have mistaken (as colour-blind individuals are apt to do) a shade of one colour for another colour. A very intelligent colour-blind gentleman, whom we examined most carefully with a full spectrum, said that to him there were only two colours—the line of demarcation being sharply at the blue, and when the lines between the yellow and green, and the green and red were pointed out to him, he said he saw no difference whatever. It was all the same colour, only it became darker towards the red end. The spectrum was not shortened for him at either end. There was no line of separation visible to him between the violet and the blue. It is, however, not impossible for the spectrum to appear divided into three parts to some red-green blind. In a spectrum which runs over into a purple, there may be a shade of yellow visible at the blue end on account of the preponderance of the red over the blue in the purple, and all red rays give rise, in the red-green blind, to the sensation of yellow. We should, in this instance, have yellow (or red as the colour-blind often calls it) at each end and blue between.

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[1] Archiv f. Oph. xxiv. 4.

This fact is insisted on by Mauthner in bringing the Hering theory to the elucidation of the phenomena of colour-blindness, that all red and green rays give rise to the sensation of yellow in the red-green blind, and violet to the sensation of blue. The only two colours which are never mistaken are yellow and blue. If you place an assortment of coloured wools before a red-green blind individual, he will pick out all the pure yellows and blues without any hesitation. It is the shades of the other colours which he confounds. Take, for instance, the second test of the Holmgren method.

A *purple* (rose) skein is laid before the person to be examined. It must be between the deepest and lightest shades of the scale.

If he lays with this only *blue* and *violet* or one of them he is *red-blind.* If he lays with it only *green* or *gray* he is *green-blind.*

These diagnoses are arrived at on the supposition that in the first instance the red-blind sees only the blues and violets, which the advocates of the Hering theory are willing to accept as far as regards the blue, with this modification, that while there is a certain amount of yellow sensation in the red, that of the blue is predominant, and for this reason the blues are laid beside it as shades of the same colour. But they are not willing to believe that, because he lays green and gray with purple, he is green-blind alone. Mauthner claims that in the red-green blind the dissimilative power of the red and green are different in different individuals. In those cases where the green is laid with the purple the D-power of the red in the purple is in excess (as yellow) of the blue, and of course those colours belonging to the yellow end of the spectrum are selected. In those cases where gray is the selected colour, the A- and D-power of the two are nearly equal, and counteract each other, leaving only the black-white substance. It will be seen from this that we may have almost any shade of colour from blue to red laid with purple in the case of red-green blindness, depending altogether on the relative A- and D-power of the red and blue.

The strongest argument against the existence of separate and distinct red and green blindness is the fact that in an assortment of coloured wools the green-blind cannot pick out all the reds, nor the red-blind all the greens.

Any one who has made any examinations of the colour-blind knows how uncertain they are when dealing with those two colours. They are all at sea, and appear utterly helpless, and what is very curious seldom make the same errors twice, showing that there can be no sharply-defined law governing their choice. All of which phenomena becomes clear and intelligible under the Hering theory.

In examinations with the full spectrum, it often happens that the red-green blind sees a grayish band corresponding to the bluish green, which is readily accounted for by the D-action of the blue being counteracted by the A-action of the green, leaving only the action of the light on the black-white substance.

Blue-yellow-blindness is so very rare that we will not consume space with its detailed consideration. It is evident, however, that the same principles will apply here as in the case of red-green blindness.

Mauthner gives in full the different methods for examining the chromatic sense, by the coloured shadows, simultaneous contrast, the choice of coloured wools, the pseudo-isochromatic method, etc. etc., and proceeds to explain all the errors the colour-blind commit in accordance with the Hering theory. This it is needless for us to repeat, since after the exposition of the theory which we have given any one will be able to classify and explain these for himself.

Mauthner prefers coloured powders in small bottles to wools, either in the isochromatic or the pseudo-isochromatic method of examination. In the latter case two powders of the colour which the colour-blind is likely to confound are placed in the same bottle, one on top of the other, in which case the colour-blind will discern only one colour. He has devised twenty-four bottles of these pseudo-isochromatic powders, which will cover all the mistakes a colour-blind person is likely to make.

Though the Holmgren method may not be as strictly scientific as some, and though, no doubt, some degrees of colour-blindness escape detection by this method which are readily discovered by others—the coloured-shadows for instance—yet it remains for all practical purposes the best that has yet been devised. There is no other method by which large bodies of people can be examined with such an approach to accuracy in so short a time as by this method. As this method is so generally known now, and as we have already given the method of making the important diagnostic test with the purple sample, we will not explain it in any greater detail.

The method by coloured shadows, however, is simple, and where one or two persons are to be examined, is quite as trustworthy as the Holmgren method—indeed some express a decided preference for it. This examination is made as follows: In a darkened room there are two lights—a candle and a lamp—placed on a table about 25 cm. from the wall, which is covered by a white paper. These lights are about 20 cm. distant from each other. Before the lamp a coloured glass (say a red) is placed. You will then have the white paper illuminated by both the red and white lights. If you now place a lead pencil upright on the table 2 cm. from the wall, and equidistant from the two lights, there will be two shadows, one thrown by the *red* light, the other by the *white* light. Where the white light is cut off by the pencil, there will be only the red colour, while where the red light is cut off by the pencil there will be only the white. But by the law of contrasts, the shadow on the white ground will be the complementary (or antagonistic) colour of the coloured shadow. Hence, to a normal eye, the one shadow will appear red, while the other will be green. To the colour-blind there is no difference. Theoretically, however, this method is also open to objections, for the A-action of the red (or yellow) should call forth as a contrast colour a blue. In such cases, however, the blue is so dark as to appear, except to the closely observant, as black. Did our space permit we should like to follow our author through his consideration of the question of Dyschromatopsia (diminished colour-sense) acquired colour-blindness, and the chromatic sense at the periphery of the retina, and other aspects of the question which he touches in his pleasing and masterly manner, but the task we set before us was a presentation of the most prominent theories of colour-perception and their application to the explanation of the phenomena of colour-blindness, in which attempt we hope to have been reasonably successful. S. M. B.

ART. XXXII.—*Tracheotomy in Laryngeal Diphtheria (Membranous Croup), with especial reference to after-treatment: to which are added a few general remarks on Diphtheria, and its earlier treatment.* By ROBERT WILLIAM PARKER, Assistant Surgeon to the East London Hospital for Children; late Resident Medical Officer, Hospital for Sick Children, Great Osmond Street. 8vo. pp. xii., 82. London: David Bogue, 1880.

THIS monograph is an extension of a paper presented at a meeting of the Royal Medical and Chirurgical Society of London, and published in the last volume of its Transactions. It is based chiefly upon the records of twenty-one personal observations, briefly described in an appendix. Twelve of these cases terminated in recovery; sixteen of the operations, including eight recoveries, having been performed by the author; two, both successful, by Mr. Marsh; and three, two of which were successful, by Mr. Hayward. While the number of cases tabulated is small, the proportion of the successes is unusual. This success is attributed to the excellence of the after-treatment.

Passing the introductory historical survey of the operation, and the general remarks on tracheotomy, as containing nothing worthy of special note, we find the author expressing his adherence to the view that croup and diphtheria are to be considered as etiologically identical. He then presents a few passages on the pathology of the disease, followed by a narrative of symptoms almost wholly quoted from Dr. Charles West, and concludes with some remarks on general treatment. The local application of hydrochloric acid, diluted with two or three times its bulk of glycerine, freely used once or twice, or even oftener, when the disease commences primarily in the pharynx or posterior nares, is regarded as "a most efficacious application." Confinement to the "croup-bed"—a crib, nearly surrounded with curtains or sheets, and maintenance of a warm moist air impregnated with creasote or carbolic acid, are recommended as soon as the first symptoms of laryngeal complication come on; at which stages, likewise, sprays of soda solutions are deemed particularly serviceable.

The chapter on tracheotomy discusses the period for operating, the surgical anatomy of the trachea and superjacent structures, and the details of the operation. Chloroform is deemed a safe anæsthetic, especially if its administration begin with a few drops sprinkled on a cloth and held to the child's face by degrees, to be pushed more rapidly as soon as two or three whiffs have produced drowsiness. The high operation, above the isthmus of the thyroid gland, is preferred to the lower; and no hesitation is evinced in including the cricoid cartilage in the incision. This is the operation urged by Prof. Hüter of Greifswald. Quite a number of good operators prefer the lower and more difficult operation, and question the propriety of dividing the cricoid cartilage, even when they do the high operation. An objection which may be urged against dividing this cartilage, apart from the fact of its being the strong part of the larynx, and its liability to necrosis, especially if a tube has to be employed beyond a very few days, is based on the fact that false membrane is frequently caught in that portion of the air tube, and there is some danger of impacting it into the trachea during the actual incision into the air passage. Serious accidents from this cause have been narrated.

Preference is expressed for Langenbeck's most admirable method of dissecting the tissues. It consists in lifting the layers of fascia successively between two pairs of forceps and dividing between them. An automatic retractor, devised by the author, is figured, and recommended when assistants are not at hand; otherwise retractors are not advised as a rule. The duty of clearing the trachea of obstruction before inserting the canula is justly insisted on, and, like Hüter, the author has devised a flexible tube and reservoir, of which a figure is given, to facilitate suction by the mouth without danger of inspiring diphtheritic masses. He gives a similar reason to Hüter for preferring this mode of aspiration; namely that the amount of force employed can be more readily and delicately adjusted.

The curve of the canula is an important point in the author's estimation. Instead of the ordinary quarter-circle tube, the end of which tends to impinge on the anterior wall of the trachea, he proposes an angular curve which corresponds more nearly with the anatomical direction of the trachea, as exhibited by him in a pair of illustrations from Braune's atlas; —illustrations, by the way, of the parts in the adult male, and not in the child.

Dr. Parker meets the chief indication in the after-treatment,—the prevention of recurrence of obstruction, by providing for copious inhalations of warm, moistened air, by means of a special ventilating croup-kettle devised by himself; an apparatus which, judging from the description and illustration, seems to be admirably adapted to the purpose. He likewise urges the systematic use of disinfectants, as supplied by adding a little carbolic acid or creasote to the water in the croup-kettle at the side of the "croup-bed." To relieve troublesome cough, he uses inhalation of compound tincture of benzoin (ʒj ad ℥j), combined with a few drops of chloroform, or given alone, according to requirements. He likewise attests the value of the action of solvents to liquefy the membranous exudations, and prefers carbonate of sodium (grs. 10–20 ad ℥j) sprayed in front of the canula for five or ten minutes at a time, at such intervals as circumstances indicate.

The following complications are briefly discussed, and appropriate treatment indicated: inflammatory œdema of the neck, diphtheria of the wound, pharyngeal obstruction, adhesions between the vocal bands, growth of granulations, pressure-sores, and cicatricial narrowing.

Among the cases narrated is one in which the tube could not be dispensed with until the 175th day after the operation. The difficulties in this case suggested the device of a metallic or gutta-percha plug to prevent undue contraction of the artificial orifice during the absence of the tube, in attempts to restore breathing through the mouth. One cause of the protracted retention of tubes, in cases in which no mechanical cause is present, is inferred to be the mechanical disuse of the laryngeal muscles; a point which had already elicited the attention of the writer of this notice.

It is a matter of surprise that the name of Sanné, who has worked up the subject matter of this monograph in such a masterly manner, does not once occur in the text; although it includes not a little to sustain the accuracy of that author's observations. J. S. C.

ART. XXXIII.—*Traité d'Anæsthesie Chirurgicale contenant la Description et les Applications de la Methode Anæsthesique de M. Paul Bert.* Par le Docteur J. B. ROTTENSTEIN, Membre de l'Academie Leopoldina Carolina, de la Societe Odontolgique de New York, etc. 8vo. pp. 428. Paris: Germer Baillière et Cie. 1880.

A Treatise on Surgical Anæsthesia, with the Description and Mode of Application of the Anæsthetic Method of Paul Bert. By Doctor J. B. ROTTENSTEIN.

WE presume our readers will share in the regret we feel that Dr. Rottenstein's work did not come to hand in time to notice it with other recent works on Anæsthetics. The subject has been so recently considered at some considerable length that it is unnecessary to go over the ground again. Nevertheless, a contribution to the study of this important class of medicines, of such pretensions and character as this, cannot be permitted to pass in silence, and we must make an attempt to present some statement of its contents, and place an estimate upon its value.

It is to be seen from the title appended to the author's name, as well as from the list of works he has already published, that he belongs to the dental fraternity. In stating this it is by no means intended to imply that therefore he is not qualified to teach us something in regard to anæsthetics, or that he could not give us a good book. It suggests, however, at the outset, that he has been unfortunate in the choice of a title, and this is really the case. He has copied the title of the work of MM. Perrin and Lallemand, which was issued seventeen years ago, has followed closely the plan of those authors, as the whole field of anæsthetics is gone over, while his practical acquaintance with them is restricted, or almost restricted, to a single one. The work should have been called "A treatise upon nitrous oxide gas as an anæsthetic, and a plea for a more extended use of it in general surgery." Whatever there is in the book of value, and whatever there may be in it new or deserving of consideration relates to this branch of the subject, and upon this branch of the subject it is a contribution of very considerable value.

We find already in the preface indications of the stormy debate which has attended the choice of an anæsthetic in France. Discussion of the merits of the different articles has been carried on, not only with warmth, but at times with the passion of partisanship. "Chloroform, pure and well administered, never kills;" "Chloroform is the most dangerous of anæsthetics;" "The protoxide of nitrogen asphyxiates and does not anæsthetize;" these have been rallying cries of parties for years, and men who canvassed with calmness and moderation the relative value of different operative procedures became, all at once, excited and passionate when the question of anæsthetics was opened. Finally, it has settled down to chloroform for Paris and the rest of France, ether for Lyons. But this is not the position of the author. He would banish chloroform from practice except for military service and in obstetrics, prefers ether as "infinitely safer," but maintains that nitrous oxide has not yet had accorded to it in France the position it deserves. Introduced by Dr. Colton, its use has spread and become general among dentists, while it has been the subject of but little scientific study, and but few attempts have been made to adapt it to general surgery. In this respect, the author says, the French have been far surpassed by "our neighbours across the channel, more practical and less prejudiced than we are."

It follows as matter of course that the larger portion of the book is devoted to nitrous oxide, and a good deal of it taken up with the consideration of controversial points which would not be necessary here. The longest chapter, extending to fifty-eight pages, is upon the physiological action of this gas. The author has availed himself of the labours, and, indeed, given much in full, verbally, of the recent contributions in this field of such men as Krishaber, Jolyet, and Blanche, Zuntz and Goldstein, and Paul Bert. Some of the especial points presented are the innocuousness of the gas, the fact that it has really an anæsthetic effect independent of and preceding asphyxia, and that blood pressure and cardiac action "change under the influence of N_2O in the same manner as under the influence of asphyxia by suffocation."

Figures and full descriptions are given of the various apparatus for the administration of nitrous oxide, and among them are the portable ones of Johnston of this country, and to them is given the preference over all others. Barth's and Clover's apparatus for the combined administration of ether and nitrous oxide are also figured and described.

In regard to the great relative and almost absolute safety of nitrous oxide, Dr. Rottenstein is, of course, very emphatic, and his work furnishes higher figures upon this point than we have anywhere else found. He publishes a letter from Dr. Colton, dated in New York, May, 1877, in which it is stated that from the time of beginning the record up to date there had been about one hundred thousand administrations by the Colton Dental Association, without a single death, and "without any accident of sufficient gravity to necessitate transporting the patient in a vehicle." About one patient in a hundred and fifty suffered from subsequent nausea. In summing up, towards the close, the author thinks that without drawing upon the imagination, the number of inhalations of nitrous oxide as an anæsthetic may be placed at more than a million, and he admits only two, well-authenticated cases, of death. He enforces this array of figures with the powerful argument that this result has been obtained by administrators of all grades as to competency and prudence, and under the certain use of much badly-prepared gas.

The one great drawback to the use of nitrous oxide as an anæsthetic in general surgery is the brief duration of its effects. To the anæsthesia it produces rapidly succeed symptoms of asphyxia, which, if the administration be prolonged, would speedily become fatal. The figures and facts presented above cannot fail to suggest at once the thought and the desire that some plan should be devised to prolong the action of this gas, and thus extend its application to the purposes of general surgery. The attempt has been made, and "anæsthesia by the method of Paul Bert," which occupies a place on the title-page of Dr. Rottenstein's book, is a method designed to solve this difficult and important problem. The theory of M. Bert is that, as the gas must be administered pure, this signifies that its tension must equal that of the atmosphere, and that, therefore, if the pressure could be increased to two atmospheres a mixture of fifty per cent. of the gas and air could be respired, anæsthesia be produced, and the actions of the organism proceed normally. Experiment sustained the theory. Animals which were caused to respire a mixture of five-sixths of protoxide of nitrogen and one-sixth of oxygen under a pressure of one-fifth of an atmosphere, became rapidly profoundly anæsthetized, and remained so any length of time without symptoms of asphyxia supervening. The blood kept its normal colour, the heart continued beating with regularity and with its usual force. "In a word, all the phenomena of vegetable life continued with regularity, while those of animal life were absolutely abolished." Upon restoring the animal to the air it recovered sensibility and consciousness almost immediately.

The rapid cessation of the effects of nitrous oxide is held by the author all through this book to be due to the fact that the gas is simply suspended in the blood, while ether and chloroform enter into chemical combinations in the organism, combinations which it requires time to break up for the process of elimination of the anæsthetic agent. He constantly speaks of this as an established chemical fact, but does not give the proof or direct references to where it can be found.

The next step was to test M. Bert's method clinically. An apparatus was provided, a chamber in which an increase of atmospheric pressure could be effected, and an ingrown toe-nail removed by the eminent surgeon Labbé. Another eminent operator, no less an one than M. Péan, tested the new method, and he has performed a number of operations under it, some of them of severity and of considerable duration.

The administration of a mixture of nitrous oxide gas and oxygen under increased atmospheric pressure is, then, the method of anæsthesia of M. Paul Bert, the method which Dr. Rottenstein has adopted, advocates, and champions.

Two objections at once present themselves. The first, relates to the special apparatus necessary for its administration. This is such that Dr. R. admits at once that the method cannot be adopted in country practice, or anywhere but in large cities. Nor will the doubts upon this point as to its use anywhere be allayed by an inspection and study of the kind of apparatus required as figured and described in this book. A receptacle of sheet iron (*cloche pneumatique*), large enough to contain patient, surgeon, and assistants, must be furnished, and this is to be provided with pneumatic pump, with apparatus for supplying the gases and for insuring ventilation! This plain statement is sufficient; the particulars of description need not be given—for the present at least. Nor could the question of cost be overlooked or forgotten. As such an innovation must be brought into the profession through the hospitals the author makes an estimate for the benefit of these institutions, and as in hospitals there is teaching, the receptacles must be large enough to contain students. They can be made of any size, and the author puts the price of one large enough to contain three hundred persons at "*scarcely* 30,000 francs!" while for 15,000 francs, or $3000, a complete apparatus can be obtained with a capacity of forty persons!

The second objection is that sufficient proof of the great superiority, or absolute safety, of this mode of anæsthesia is not furnished. To what extent experiment upon animals has been pushed is not stated in this book. Possibly it is detailed in M. Bert's communications to the Academy of Science,[1] but it is not here. As to the clinical proof, it amounts to two operations by Labbé, and sixteen by Péan, a total which is not a respectable fraction of what can be presented in favor of bichloride of ethidene, or bromide of ethyl. To assume that the agent, being nitrous oxide, is therefore safe, is to rest the question just where it was before the method was designed and applied. We cannot agree, therefore, with the author, when he says, speaking of the first two operations, that "these two very conclusive observations permit us already to give a definite decision upon the value of this method," nor can we believe, with him, that by this method "the protoxide of nitrogen has entered into the domain of grand surgery."

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[1] Comptes Rendus, 1878, 1879.

We are happy to find that the author is a warm supporter of the use of chloroform in physiological labour. We find also in his book confirmation of the statement that opposition to the use of this agent simply for the relief of the sufferings of parturition is limited to a very few of the leading obstetricians of France. Dr. Rottenstein mentions only Pajot and Pinard, but Depaul, in his *Obstetrique Clinicale*, decidedly opposes this practice. Singularly enough Pajot does not oppose it on account of its danger, but denies its efficacy, *i. e.*, the fact of the relief of pain by small doses and intermittent inhalations! That a man of his position and ability should maintain such a position upon a point so easily submitted to personal experience, and so readily shown to be untenable at any bedside, is either a wondrous instance of inequality of mental action or of the strength of prejudice. But what shall we say of the state of affairs where an author has to enter upon a laboured argument to prove that chloroform does not cause, in women under its influence, "a compromising loquacity," in which delicate secrets are betrayed! We are glad to learn that such things are not believed by the experienced practitioners of France, and that it should be considered necessary to enter into any consideration of it is enough to upset the patience of a saint![1] As supporters and defenders of the administration of chloroform in natural labour in France the author names, besides "the lamented Campbell," Danyau, Bailly, Bucquoy, Legroux, Hervieux, Fereol, and Dumontpallier.

We close with a brief notice of the two opening chapters of the work, which are historical and devoted to the discovery and progress of anæsthesia. In regard to the latter we have the important and startling piece of information that, upon the appearance of chloroform American surgeons received it "with a certain coldness! and, after having experimented with it, finished by entirely rejecting it!" As to the discovery, the author devotes himself to the exposition of the claims of Horace Wells. He notices the claim of Marion Sims for Dr. Crawford Long as the discoverer of anæsthesia, but decides that "publicity is the touchstone of invention," and that the dates decide the question.

"It appears to us, therefore, that Marion Sims has yielded too readily to the impulses of his generous heart in accepting the claims of Long, who, if he really discovered anæsthesia, committed the immense wrong of not making known a discovery which would have immortalized his name, and, at the same time, rendered such great service to humanity."

The author has graced his book with an excellent steel engraving of Wells, and urges his claims with energy and enthusiasm. J. C. R.

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[1] We gather from the author that French practitioners do not believe in the erotic effects sometimes caused by anæsthetics!—such effects "as are attributed to them by the author of *Nemesis*," whoever that may be, "in the following lines:—

"Là c'est le doux repos, l'extase, le plaisir,
Le spasme de l'amour, quand l'éther hallucine
Le jeune femme en proie aux tourments de Lucine;
Oh! d'un double mystère ineffable pouvoir,
Au momente qu'elle enfante, elle croit concevoir!"

ART. XXXIV.—*On a Case of Molluscum Verrucosum presenting certain Unusual Features.* By JAMES NEVINS HYDE, A.M., M.D., Professor of Dermatology, Rush Medical College, Chicago. (Read at the third annual meeting of the American Dermatological Association in New York, August 27, 1879.) Reprinted from the *Edinburgh Medical Journal* for February, 1880. Pamphlet, pp. 18.

DR. HYDE describes the case of a healthy man of thirty-five, who two years previously had begun to notice over the left buttock numerous white spots or points, about as large as pin-heads, which gradually extended by multiplication, at first upwards over the loin, then downwards upon the inner and outer faces of the thigh, the corresponding surfaces of the other side gradually becoming similarly involved. After lasting a year, these spots disappeared, but came back again in the same localities, extending until, when examined by Dr. Hyde, the integument of the trunk, thighs, arms, and legs, to the level of the tops of the patient's boots, displayed an eruption of a papular type. The head and neck were almost or quite free, as also were the feet and ankles, the genitals and palms. The lesions were very characteristic and peculiar. They varied in size from a small pin-head to millet-seed and to split-pea, being well rounded in contour, never squarish, projecting from the surface to the extent of from one to three millimetres, with a globoid profile. The summit of each was neither umbilicated, flattened, nor acuminate, but strictly globoid. There was no scale, crust, scab, concrete pus, pustule, nor vesicle visible upon the surface. The lenticular projections did not primarily invade either the hair or sebaceous follicles. Perspiration was normal. The lesions themselves involved the entire thickness of the integument; the skin in the neighbourhood was quite healthy. The newer lesions were dead white, resembling milium. As they enlarged and multiplied they assumed at the base and sides a rosy pinkish colour, never violaceous. The summit of the lesions was waxy-white. The lesions were quite solid, containing no serum or pus, and they were entirely free from subjective symptoms, as burning and itching. In the course of the following months, being autumn and winter, the lesions disappeared, leaving purplish discolorations, which did not vanish on pressure. The original eruption recurred again, however, in the following summer, the lesions being seated on the purplish discolorations remaining from the year before. The patient remained under observation during the following year, but the eruption did not again make its appearance. No treatment was employed at any time, the disease being allowed to run its natural course. A portrait of the disease is given which shows fairly well the grouping of the lesions, and to this is added a picture of the microscopic appearance of one of the lesions in section. The latter is not altogether satisfactory, owing, as Dr. Hyde explains, to some accident in the preparation of the specimen.

Dr. Hyde discusses the diagnosis of this very peculiar and interesting disease with considerable fulness, more particularly in connection with the affections known as lymphangioma tuberosum multiplex, telangiectasis, molluscum sebaceum, and molluscum verrucosum, finally concluding in favour of the latter category as that to which his case properly belongs. The report of this case is quite a model of painstaking thoroughness and accuracy of observation. A. V. H.

ART. XXXV.—*Lectures on the Human Eye in its Normal and Pathological Conditions.* By ADOLPH ALT, M.D., Lecturer on Ophthalmology and Otology in the Trinity Medical School, Toronto, Canada. 8vo. pp. 208. New York: G. P. Putnam's Sons, 1880.

THIS volume is an elaboration of a course of lectures delivered at the New York Ophthalmic and Aural Institute, and is a practical treatise on the normal and, more particularly, the pathological histology of the human eye. The tissues of the eyeball only are considered, but the author proposes to treat of the accessory parts in a future publication.

So much of the normal histology of each tissue is given as is necessary to an appreciation of the pathological changes to be described, and in the case of disputed points the latest views are briefly but carefully discussed.

The author had been engaged for a number of years in collecting microscopical specimens from normal and pathological eyes for his own instruction, until his material became so extensive that he felt justified in publishing the results of his researches. These researches have been so extended that the book assumes the character of a systematic treatise, and is an excellent hand-book, containing a mass of useful information on this important subject in a more accessible form than can be found elsewhere.

The illustrations are all drawn from specimens in the author's own collection; many of them are rare, some are unique, and all are well executed.

We believe that this is one of the few books that really "fill a want long felt," and that it will be found an acceptable addition to the library not only of the ophthalmic surgeon or the histologist, but of every medical man whose interest in his profession extends beyond the routine of his daily practice. G. C. H.

ART. XXXVI.—*A Ministry of Health, and Other Addresses.* By BENJAMIN WARD RICHARDSON, M.D., F.R.S., M.A., LL.D., F.S.A., etc., etc. 12mo. pp. 354. New York: D. Appleton & Co., 1879.

THIS volume of Dr. Richardson's thoughtful and scholarly addresses, takes its title from the lecture which worthily holds the place of honour in the volume and at the same time is now of peculiar interest to American sanitarians, because it deals with the difficult but all-important problems which surround the complete establishment of our National Board of Health.

In this initial essay our author, with his usual eloquence and cogency of argument, urges that the new Minister of Health should be "an authority, not a disciplinarian; a judge and director, not a commanding officer," and that he should have a general control and supervision of, I. Registration of Diseases, II. Meteorology, III. Coroner's Returns, IV. Local Medical Duties, such as Vaccination, V. Reports on Adulterations, Analyses, etc., VI. Factory Supervision, VII. Veterinary Subjects, VIII. Oversight of Prison and Police Affairs, IX. Supervision of Public Works.

The remaining addresses are respectively entitled, "William Harvey," "A Homily Clerico-Medical," "Learning and Health," "Vitality, Individual and National," The "World of Physic," "Burial, Embalming, and Cremation," "Registration of Disease," "Ether Drinking and Extra-Alcoholic Intoxication." J. G. R.

ART. XXXVII.—*Iodic Purpura.* By GEORGE F. DUFFY, M.D., etc. Reprinted from the *Dublin Journal of Medical Science*, April, 1880. Pamphlet, pp. 21.

DR. DUFFY'S paper, originally read before a Dublin medical society, is based upon an interesting case, observed by himself, in which a man twenty-five years of age, under treatment for articular rheumatism, was ordered iodide of potassium. This the patient took for a month, first in doses of ten grains thrice daily, later in twenty-grain doses, the total amount taken being two and a half ounces. At the end of this time a copious eruption of small purpuric spots appeared on the anterior surface of the legs and feet. The iodide having been discontinued, the eruption disappeared at the end of ten days, but showed itself once more a week later, within twenty-four hours after beginning the medicine again, in fifteen-grain doses thrice daily, only forty-five grains having been taken. Dr. Duffy then substituted iodide of sodium in ten-grain doses thrice daily. No eruption appeared even after half an ounce had been taken. Iodide of ammonium was then given instead of the sodium salt in the same dose, but, before twenty grains had been taken, the purpuric eruption again appeared.

In connection with this case, Dr. Duffy gives some account of other papers on iodic purpura previously published, and also discusses the iodine eruptions in general, giving the views of various authors as to the physiological action of the iodine salts in these cases. The weight of testimony thus far seems to point to a greater or less disorganization of the capillary walls, permitting diapedesis of the cellular constituents of the blood. To the action of the free iodine liberated from the alkaline iodides in the blood is probably due the effects of these drugs on the system. Dr. Duffy's observation coincides with that of Ringer in going to show the greater activity of the ammonium salt, possibly due to its containing a larger percentage of iodine (87 per cent.) than the other salts.

In the discussion which followed the reading of Dr. Duffy's paper, and which is given in his pamphlet, other cases were mentioned in which the external use of iodine had produced urticarial and erythematous eruptions in other parts of the skin. It was also suggested that, when the iodides were likely to disagree, iodine could be administered to advantage either in connection with tannic acid or in light claret. A. V. H.

ART. XXXVIII.—*Notes on Diseases of the Testis.* By SAMUEL OSBORN, F.R.C.S., late Surgical Registrar to St. Thomas's Hospital. 12mo. pp. 117. London: J. & A. Churchill.

THIS little book discusses diseases of the testicle alone, without entering upon the subject of scrotal affections. Hence no mention is made, except indirectly, of hydrocele. It is difficult to see any mission for the volume to fill, since it is much too concise and elementary to occupy the place of a true monograph, and scarcely contains any information that cannot be found in the chapter on diseases of the testicle in any work on general surgery. This fact suggests the impropriety of its being published in book form. The author has retained the word sarcocele, and describes five varieties: simple, syphilitic, tubercular, fibrocystic, and malignant. It would be better if this meaningless term had been dropped altogether, for it seems, to some of the profession at least, to be a remnant of the time when many conditions were comprehended under one name of Greek derivation. The handling of the various topics is generally good, but there is not enough investigation and research shown to render the book one of reference for writers or practitioners. Perhaps Mr. Osborn intends to present a more elaborate monograph to the profession at a subsequent time. J. B. R.

ART. XXXIX.—*A Practical Treatise on Urinary and Renal Diseases, including Urinary Deposits. Illustrated by numerous Cases and Engravings.* By WILLIAM ROBERTS, M.D., F.R.C.P. Lond., Physician to the Manchester Royal Infirmary, etc. Third American, from the third revised and enlarged English edition. 12mo. pp. xx. 631. Phila.: Henry C. Lea, 1879.

DR. ROBERTS's volume has long been esteemed the best systematic work in the English language on urinary and renal diseases, and in preparing the third edition of it for the press Dr. Roberts has not overlooked the recent advances which have been made in our knowledge of these diseases.

In this edition Dr. Roberts no longer gives Prof. Haughton's method of estimating the amount of urea in urine from the specific gravity, but recommends Liebig's method, and Davy's process as modified by Russell and West.[1] The latter, he says, he has found "easy, accurate, and speedy." He also recommends his own "dilution method" for the estimation of albumen in the urine.[2]

I. M. H.

ART. XL.—*Bericht über Zehn Laparatomien, ausgeführt* von Prof. F. AHLFELD. *Deutsch Medicinische Wochenschrift*, 1880, Nos. 1, 2 and 3. *Report of Ten Laparotomies.* By Prof. F. AHLFELD.

PROF. AHLFELD begins his article with an account of the circumstances under which his operations were done—the wholesome room, the skilful assistants, the complete set of instruments at his disposal. He used the spray of carbolic-acid solution, because he thinks, if there were no other reason, one reproaches one's self for any untoward result if it has been omitted. He made a point of perfect cleanliness on the part of himself and those who helped him, even to noting any fetor of the breath, and requiring careful cleansing of the oral cavity. For anæsthesia he used chloroform, and remarks that he seldom had vomiting or any other disturbance of his operations. This he attributes partly to his plan of allowing no food or water for twelve hours before, and only fluid food during the eight days preceding the operation. A few days before operating he made a trial of the anæsthetic, and seized the opportunity to make a thorough physical examination of his patient.

Of his ten operations, three were ovariotomies, three removals of large cysts of the broad ligament, and one of a hydronephrosis; two were

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[1] American Journal of the Medical Sciences, April, 1875, p. 531.
[2] Ibid., Jan. 1878, p. 209.

" *Freund's* Operations," and one an exploratory incision which forbade going further.

Ovariotomies.—(1) March 1, 1878. Removal of a multilocular cyst, weighing 42 lbs. Recovery in twenty-six days.

(2) April 19, 1879. Double tumour of right ovary as large as a child's head; of left the size of a goose egg. The left was easily removed; the right burst, and its dermoid contents were impossible of entire removal from the abdominal cavity. Peritonitis followed, and death in forty-four hours.

(3) Oct. 9, 1879. Very universally adherent cystic tumour. Recovery without any fever. First dressing not removed till thirteenth day.

Broad-based Cysts of Broad Ligament Removed.—(1) April 19, 1878. Followed the unique example of Schatz. in splitting the cyst and sewing the edges to the abdominal incision. A fistula remained, as in the case of Schatz, but gave so little trouble the patient would not have anything done to it.

(2) June 15, 1878. In this case Ahlfeld enucleated the cyst, removed as much as possible of the thickened peritoneum, sewed the edges up tight, and then the abdominal wound. Recovery complete the twenty-first day.

(3) Aug. 9, 1879. Cyst of right broad ligament, extending up to near the xyphoid cartilage. After puncturing, he split up the cyst, and shelled it out of the peritoneum. A large part of this he then cut off, sewed up the edges, and closed the abdomen. Recovery without any fever.

Operation for Hydronephrosis, reported in the *Arch. f. Gynækologie*, Bd. 15, Heft 1.—Recovery, with a small fistula from the pelvis of the kidney.

Exploratory incision, made upon a diagnosis of carcinoma of an ovary and possibly of the omentum. There was found to be general carcinoma of the peritoneum and omentum, and the wound was sewed up without doing anything else. It healed without fever. (Appended to this case, which we have placed here, instead of at the end, as it appears in Ahlfeld's article, is a strong recommendation of the exploratory incision.)

We now come to what we wish particularly to call attention to, namely, the two operations Ahlfeld did as " Freund's Operations," with his comments upon them.

Freund's Operation is fully described in Volkmann's *Sammlung Klinische Vorträge*, No. 133. It is made much clearer by cuts; but the following notes will give a fair idea of its " *technic*." After emptying the bladder and rectum, and washing out the uterine cavity with a ten per cent. solution of carbolic acid, the abdomen is opened from two inches below the navel to near the symphysis pubis; the intestines are held up from the womb by the hand, with a wet napkin interposed; the fundus of the womb is secured and held up with a strong ligature; three ligatures are now passed on each side, to seal up the surfaces to be made by incision. The first ligature is passed through the Fallopian tube, and then through the proper ligament of the ovary; the second through the ovarian ligament and the round ligament; the third through the round ligament and the anterior and posterior walls of the vagina near the cervix. These ligatures being firmly tied, and their ends left long, the uterus is cut free from the vagina and the broad ligaments inside the ligatures, and so removed entire. The ends of the ligatures are now passed down into the vagina, and drawn upon so as to invert the cut edges and bring them down into the vagina; while above sound peritoneal surfaces meet in a line across the pelvis and between the bladder and rectum. These sound surfaces are stitched together closely and firmly, the cavity of the abdomen is thoroughly cleansed out, and the abdominal wound sewed up tight. A tampon, soaked in carbolized oil (ten per cent.), is placed in the vagina, while over the abdomen antiseptic wadding is placed.

(1) March 9, 1879. Patient 57 years old, married, had sarcoma of the uterine cavity, for which Professor Ahlfeld had, nearly two months before, incised the os and removed as much of the growth as he could. When he undertook "Freund's Operation," he found that he could not remove the womb without greater risk than he thought it right to take. For this reason, and because he thought he found metastatic deposits on the omentum and meso-colon, he abandoned the operation, cleansed the abdominal cavity, and closed the wound, applying "Lister's" dressings. The operation lasted over two hours. The wound healed without fever; but on removing the dressings on the seventh day a stercoraceous fistula was discovered at the lower angle of the wound, which the operator attributed to his having accidentally included one of the intestines in a suture. This closed up in six or seven days.

(2) April 30, 1879. Patient 57 years old, married, had had symptoms of carcinoma for about a year. When the operator had opened the abdomen, and was passing his hand into Douglas's pouch, back of the womb, this broke in, and later broke off; continuous hemorrhage hid the parts from his view; and he had great difficulty in separating the womb from the rectum and bladder; symptoms of collapse made him hurry in this as well as in ligating bleeding points after cutting through the broad ligaments. He was compelled to leave the abdominal cavity open below, stuffing in a piece of lint soaked in carbolized oil, for the removal of which he attached to it a thread, which was carried out through the vagina. Then he cleaned out the abdominal cavity and closed it, placing carbolized sponges in the vagina. The operation lasted two hours. In the afternoon the lint was carefully removed from the abdominal cavity, and the sponges in the vagina changed. There was no prolapse of the bowels. On the other hand, blood appeared in the urine, and A. was sure he had wounded the bladder. The next morning, at 6 o'clock, the patient's pulse was 150; her temperature 104.9°, and soon after she died.

The account of these two cases—only the second of which can be fairly called a "Freund's Operation," and that not completed according to Freund's plan—leads Ahlfeld to some remarks in regard to this method of removing the entire uterus, which are worth repeating. He speaks of the sanguine hopes with which the operation was inaugurated, the success in its first trials which prevented its abandonment after failures which soon followed, and the impossibility, at first, of deciding how much likelihood there was of recurrence of disease. In this connection he charges Freund with underrating this aspect of the case, and rejects the claim of both Freund and Schröder that recurrence can be no more a bar to doing this operation than it is to doing any extirpation of a malignant growth, as of the testicle, breast, tongue, or upper jaw.

> "I hold," says he, "this assumption of both authors to be incorrect. The extirpation of a testicle or breast, etc., is altogether so unfraught with danger that, with certain precautions, the prognosis, as far as life is concerned, is unqualifiedly good. So the patient may look for an advantage, with little probability of a disadvantage, from the operation, and the surgeon need never hesitate to undertake it, without going into the question of recurrence. The excision of the tongue in the later stages of disease, the removal of a carcinoma of the upper jaw are sometimes absolutely necessary to save the patient from starvation or suffocation. In these cases the patient may anticipate at least a temporary improvement. Very different is it with the question of recurrence in the matter of total

extirpation of the womb. Here we have to do with an operation which only very few women survive. The physician, I believe, has no right to talk any woman over to undergoing this extremely dangerous operation, unless he has a firm hope, in case of its success, that she will be radically cured. If one considers that the extirpation of the uterus offers hope only when the morbid process is not very advanced, this is the alternative that must be presented to the woman: either to submit to an operation from which she will in all probability die, or to live one, two, or three years, with sufferings greater or less, and which may be partly palliated. I am firmly convinced that any doctor, in the case of a member of his own family, would decide against the operation."

To the article is added a table containing 68 cases. Upon examining it, and comparing it with one given by Solovieff (*Archives de Tocologie*, 1880, Janvier, pp. 1–11), we have constructed another, from which we exclude a number that cannot properly be called Freund's operations, either because they were undertaken for disease other than cancer of the womb, or because they were not completed, or because their results cannot be accurately ascertained. This reduces the number available for forming an opinion in regard to the method to 65, as follows:—

	Cases.	Recovered.	Died.	Recurred.
Ahlfeld[1]	1	..	1	
Alexander	1	..	1	
Baumgärtner	1	..	1	
Bunge	1	..	1	
Crédé	2	..	2	
Czerny	2	..	2	
Fränkel	1	1	..	
Frankenhäuser	1	..	1	
Freund[1]	13	5	8	3
Fritsch	1	..	1	
Grünewald	1	..	1	
Jaquet	1	..	1	
Kocks	1	1	..	
Langenbuch	1	..	1	
Leopold	1	..	1	
Löwenstein	2	..	2	
Martin[1]	5	..	5	
Martini	2	1	1	
Massari	1	..	1	
Müller	2	..	2	
Oelschläger	1	..	1	
Olshausen	2	1	1	1
Pernice	1	..	1	
Reuss	1	..	1	
Schäder	1	..	1	
Schede	2	..	2	
Schroeder	6	3	3	
Shepard	1	..	1	
Solovieff	1	..	1	
Spiegelberg[1]	6	1	5	1
Tillmanns	1	..	1	
Veit	1	1	..	1
	65	14	51	6

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[1] In addition to these the following cases are included in Ahlfeld's Table: four operations abandoned early and followed by healing of the wound; one, each, by Ahlfeld, Freund, Martin, and Spiegelberg; two operations by Bardenheuer, of which the result is not published; and two operations for fibroma, one by Delhaes, and one by Reyher, both ending fatally.

After search through the journals, we are unable to find any cases where English or American surgeons employed this method, though it has been fully described and sufficiently appreciated in both countries.

On going over the material at hand we find the general mortality as follows: out of 65 cases, 51 died soon after the operation—that is, 78 per cent. (This excludes, it must be remembered, the two cases operated for fibroma, both of which died.) Of the 14 that recovered, we have record of speedy recurrence of the disease in 6 cases, reducing the probable cures to 8, or only 12 per cent. Of these, there is no telling how many should be classed with the others.

We observe, again, that instead of the results improving as the number of operations increased, they have rapidly grown worse; and this ill fortune has followed Freund as well as other surgeons. Thus, looking over the cases chronologically, we see that, of the first ten, there were five recoveries; of the second, four; of the third, one; of the fourth, two; while of the last thirty cases, where the operation was undertaken, it had to be abandoned in three, was followed by death in twenty-six, and by recovery in only one.

Statistics are often misleading, and averages are dangerous as weapons of attack or defence; only the investigator who collects the former and makes the latter knows just what they are worth. But, if he be honest and candid, his opinions are of great weight, and, in estimating their worth, importance must be attached to his acquaintance with modifying considerations that cannot be put into tables. The opinions of such an one, however unusual they may appear to those who have not had time or opportunity to delve for themselves, are very apt to be endorsed by the next investigator who goes thoroughly over the ground.

For these reasons we are not surprised that our search of the records of this young operation has led us to conclusions similar to those of Prof. Ahlfeld, who rejects the plea of Freund that the increasing ratio of deaths is due to laxity in selecting the subjects for operation, or to the modifications of his method that others have introduced. The cause lies, not in these, but in the inherent difficulties and hazards of the method. The patients are usually worn in body and harassed in mind; the disease is apt to have distorted the parts involved, and weakened those near at hand; the steps of the operation are hard to carry out, some of them are likely to fail or be imperfectly accomplished in almost every case, and the whole occupies a length of time which is very much against any operation. Women stand very long administration of anæsthetics, and most extraordinary manipulations of their viscera; but every operator knows how his hopes wane, how his patience and coolness become strained, as, in a steaming atmosphere, reeking with human emanations and the odors of ether, carbolic acid, and morbid products, the perspiration rolling from his forehead, half hour follows half hour, hour adds itself to hour, and yet he cannot close up the great wound he has made, and cease from his labours, while he allows his patient to come back to consciousness.

It is true, Freund's operation has much to recommend it theoretically;—in appropriate cases, to remove all the womb, ligate the divided structures, draw the ligatures down through the opened vagina, inverting its upper part and opposing peritoneum to peritoneum above, so that it can be stitched up and seal the abdominal cavity; allowing the stump (so to speak) to drain only into the vagina, and thence from the body—all this sounds very well, but the trouble has been that it has not thus far fulfilled what was expected of it.

It is not likely, though this be true, that the method will be abandoned; but it will be no misfortune if it be left to those who are convinced that it is more useful than dangerous, to perfect and establish it. Whoever doubts may, perhaps, as well keep clear of it until its advocates shall have so modified it as to make it a real boon to humanity.

C. W. D.

ART. XLI.—*The Practitioner's Reference Book.* By RICHARD J. DUNGLISON, A.M., M.D., Editor Dunglison's "Medical Dictionary," etc., Second Edition, Revised and Enlarged. 8vo. pp. 476. Philadelphia: Lindsay & Blakiston, 1880.

IN this volume Dr. Dunglison has collected together and rendered accessible much information which has heretofore been scattered through medical literature, and was inaccessible to most practitioners. That he has performed his task acceptably, the early demand for a second edition is ample evidence; and he has availed himself of the opportunity thus offered to add several chapters, which will be found to have increased the general usefulness of the book. I. M. H.

ART. XLII.—*New Editions of Works on the Microscope.*

1. *The Microscope and Microscopical Technology.* By HEINRICH FREY, Prof. of Medicine in the University of Zurich. Translated and edited by GEO. R. CUTTER, M.D., Surgeon New York Eye and Ear Infirmary. Second edition. 8vo. pp. 660. New York: Wm. Wood & Co., 1880.
2. *The Microscopist; a Manual of Microscopy and Compendium of the Microscopical Sciences, Micro-Mineralogy, Micro-Chemistry, Biology, Histology, and Practical Medicine.* 4th edition, greatly enlarged. By J. H. WYTHE, A.M., M.D., Prof. of Microscopy and Histology in the Medical College of the Pacific, San Francisco. 8vo. pp. 434. Philadelphia: Lindsay & Blakiston, 1880.

1. THE intrinsic value of Cutter's translation of Frey is conclusively shown by the demand for a new edition in the short space of eight years from the time it was first introduced to the American public. In its present form, with a large amount of new matter added, and printed with clearer type and less prodigal allowances of blank margin to each page, it constitutes a text-book of microscopy which no student and few experts can afford to be without. Notwithstanding the thorough revision which this second edition is stated to have undergone, such awkward expressions as "strongly diluted glycerin" (p. 262) have escaped alteration, and Fig. 63 still misrepresents the *circular* dots of Pleurosigma angul. A useful appendix of the recent price lists of microscope dealers, here and abroad, is added.

2. Prof. Wythe's handsome volume, with its profusion of excellent illustrations, well deserves the distinguished success which has carried it to a fourth edition. In its present improved form it might almost be called the American Micrographic Dictionary, and furnishes information, concise, but well selected, upon nearly all the topics in the domain of microscopy. J. G. R.

QUARTERLY SUMMARY

OF THE

IMPROVEMENTS AND DISCOVERIES

IN THE

MEDICAL SCIENCES.

ANATOMY AND PHYSIOLOGY.

Function of the Medulla of Bone.

The function of the medulla of bone as a blood-forming organ may be considered as well established. This discovery is not only important in itself, but it has furnished a new field for the study of the origin of the blood-corpuscles—a field which has already yielded important facts. Our knowledge of the process is, however, still imperfect, and some of the conclusions already reached will have to be reconsidered, according to a late and important investigation by Dr. Obrastow, of St. Petersburg, an abstract of which has been published. Apart from their immediate object these researches are of interest as affording a new view of the nature of the nuclei of many forms of cells. The nucleated red cells or "hæmatoblasts" which are seen in the medulla of all mammalia, are, Dr. Obrastow asserts, as many observers have believed, actually the transitional forms of the pale cells to the red corpuscles. But the nuclei, which are seen in both the pale corpuscles and the hæmatoblasts, do not exist in them, as such, during life. The nuclear substance is uniformly diffused through the entire cell. The transformation of the hæmatoblast to the red blood-corpuscle occurs by the diminution of this nuclear substance. This diminution progresses until the substance completely disappears. The nuclei seen in the hæmatoblasts and pale corpuscles are really, as Virchow long ago hinted, post-mortem appearances due to the tendency of the nuclear substance to undergo condensation. Thus we may trace an analogy between the process by which the nuclei arise, and that of the coagulation of the blood. The nuclear substance has characteristics which show a relation to, although not identity with, fibrin. The tendency of this nuclear substance to undergo post-mortem condensation is limited by the density of the medium (protoplasm) in which it is diffused, and which, as it were, dilutes it. If the total quantity of the nuclear substance does not exceed a certain minimum, it retains its diffused condition after the death of the cell. Hence no nuclei are seen, in the hæmatoblasts of healthy animals, which are smaller than two or three micro-millimetres, and the so-called "immature red corpuscles" are homogeneous, and, morphologically speaking, non-nucleated. The presence of the nuclear substance in them can, however, be readily demonstrated by means of a watery solution of methyl-violet. This quickly dilutes the protoplasm; the molecules of the nuclear substance thus lose their condition of equilibrium, and run together to form minute granules, which do not unite into a common mass, but remain isolated where they were formed. Thus the immature corpuscles, under this reagent, present only a uniformly granular appearance. In the bodies of adult mammalia the nuclear substance of the pale corpuscles begins to undergo condensation immediately after death. At this period the protoplasm still retains its intra-vital consistence, which offers no resistance to the process of condensation of the nuclear substance, if this is present in sufficient quantity. The visible expression of this process is that, in the previously homogeneous cell, usually at one of its poles, the peripheral contour is extended, and then this contour splits in two until a protoplasmic crescent is formed, which gradually enlarges, and the inclosed nucleus at the same time contracts towards that part of the cell which is adjacent to the points of the protoplasmic crescent. Thus the nucleus is formed concentrically, but has an excentric position. Later on the protoplasmic ring shrinks and becomes more refractive—a change which is regarded as indicating an increased density of the protoplasm, possibly a sort of "post-mortem rigidity." This always occurs later than the condensation of the nuclear substance. The latter can be hindered by the addition of a weak solution of common salt, or hastened by permitting slight evaporation. If the change in the nuclear substance occurs after that in the protoplasm, the former appears as a series of granules, which at first fill the cell uniformly, and then become arranged in radiating lines. They subsequently coalesce and form fibres, which contract gradually from the centre to the periphery, until they are collected into a central nucleus, which has at first a heart-shape, and later appears as an angular shining body.

The pale cells do not undergo transformation into either hæmatoblasts or marrow-cells; the latter are distinguished from them by the circumstance that the nuclear substance assumes during life a definite morphological state—a nucleus possessing nucleoli and a denser edge. The protoplasm becomes strongly refracting, and gradually assumes a granular appearance. The pale corpuscles themselves are formed by growth from cells which may be termed "proto-leucocytes," and consist chiefly of nuclear substance (the assumed free nuclei). The process of growth consists chiefly in a gradual increase of the protoplasm, which progressively dilutes the nuclear substance. The "myeloplaxes" with granular protoplasm, and nuclei scattered through it, are the forms in which the medullary cells end, and by which they perish. After they have attained a certain degree of degeneration they unite; gradually their boundaries vanish, then their nuclei; and ultimately they are transformed into granular masses, which break up. The process of division of the hæmatoblasts must be regarded as a process which regulates the size of the red blood-corpuscles. The extrusion of the nuclei from the hæmatoblasts takes place by the process of condensation of the protoplasm, which gradually presses out the excentric nucleus.

Such is an outline of the conclusions reached in this investigation. They are certainly to a considerable extent novel, and, whether right or wrong, will excite much attention among histologists.—*Lancet*, June 26, 1880.

Nerve Influence on the Tissues.

Since the year 1869 Dr. BROWN-SÉQUARD has noted the power possessed by the central nervous system, under the influence of certain irritations, to arrest the nutrition in different tissues and organs. The maximum arrest of the interchange between the tissues and the blood is produced by a puncture near the point of the calamus scriptorius, but it is also caused by stimulation of the other parts of the cerebro-spinal centre, and even of the sensory nerves. After fatal injuries which cause death by sudden arrest of these interchanges, and arrest of the respiratory and cardiac movements, there are no convulsions, the blood in the veins is red, the temperature of all parts of the body rapidly falls; the functions of the spinal cord, of the nerves and of the muscles, are maintained for a long time, and cadaveric rigidity and putrefaction set in late. He has lately found that the medulla oblongata and spinal cord possess so powerful an influence on the interchange of material of the body that the arrest of these can be produced by merely flexing suddenly the head upon the thorax. Two effects can then be observed—(1) the blood in the veins, previously dark, becomes almost immediately bright-red; (2) the temperature of the animal falls. In addition, considerable apnœa comes on. The apnœa would cause the blood in both arteries and veins to become darker, but in spite of this influence the blood, even in the veins, becomes lighter. Dr. Brown-Séquard has often observed this phenomenon in cases of apnœa, with or without cardiac syncope, produced by irritation of the cerebro-spinal centre of the pneumogastric nerve, or of the ganglia of the abdominal sympathetic. It may be asked, however, whether the effect of the injury to the medulla on the colour of the blood is not due to the stimulation of the alleged vaso-dilator nerves? The following observation disproves the hypothesis. When there is an arrest of the interchange of material between the blood and the tissues, the vessels, instead of being dilated, present a notable diminution of calibre. Dr. Brown-Séquard found that in an animal in which the dorsal spinal cord had been divided irritation of the medulla and spinal cord, such as will cause the effects above described, produces these everywhere, except in the parts which receive their nerves from the portion of the spinal cord which is separated from the brain. Hence it is certain that the effects are produced through the agency of nerves coming from the medulla or cord and acting upon the tissues.—*Lancet*, Aug. 14, 1880.

New Reagent for the Detection of Biliary Colouring Matter in the Urine.

The ordinary reagents, nitric and hydrochloric acids, employed for the above purpose, have this inconvenience—that they are available only when the quantity of colouring matter present is considerable. M. Masset describes, in the *Archives Médicales Belges*, a new method of testing, which he regards as much more delicate. Two grammes of the urine to be examined are placed in a test-tube, and acidified with two or three drops of concentrated sulphuric acid; a small crystal of *nitrite of potassium* is then dropped in in such a way that it reaches the urine at the bottom without touching the sides of the tube. If the proportion of biliary colouring matter in the urine be large, its presence is at once indicated by the appearance of streaks of a magnificent grass-green coloration; on shaking the tube this coloration becomes uniform and of a deeper shade of green; it is unaffected by boiling, and remains unaltered for several days. The addition of water simply diminishes the intensity of the colour.

If the quantity of biliary principles is extremely small, the liquid in a very short time acquires a pale green hue, which is as lasting as the deeper shades. This coloration is easily detected by holding up the tube between the eye and the light, or on looking vertically through the tube and urine against a white background. Normal urine so treated takes on a light rose-coloured tint.

This test is well calculated to be of service at the onset of certain diseases, when the ordinary reagents render no assistance; it is extremely delicate, constant in its indications, and easy of application.—*Glasgow Med. Journal*, Sept. 11, 1880, from *Bulletin Gén. de Thérap.*, July 15, 1880.

MATERIA MEDICA AND THERAPEUTICS.

Nitrite of Amyl.

Dr. DUGAU has just published a thesis on this subject, the materials for which were carefully obtained in Professor Marey's laboratory, with the help of M. François Franck (*Récherchés Critiques et Experimentales sur le Nitrite d'Amyle*, Paris, June 6, 1879). After a good historical account of the previous researches intended to study the action of nitrite of amyl on the vessels of the heart, the respiration, blood, and temperature, the author details his own experiments, which have been made on himself and on various kinds of animals (*Revue Mensuelle de Médecine et de Chirurgie*, July 10th). He has specially endeavoured to thoroughly determine the influence of inhalations of nitrite of amyl on the circulation, and has, in relation to this part of the subject, confirmed the majority of facts already ascertained, namely, the lowering of the arterial tension, the dilatation of the small vessels, and the acceleration of the pulsation of the heart. In his opinion, these effects can only be explained by an action of this substance on the peripheric, cardiac, and vascular systems. The nitrite of amyl acts in fact on the heart and on the vessels of the submaxillary glands, after all the nerves have been cut; with strong doses, a diastolic arrest of the heart is obtained. M. Dugau believes that the dilatation is active and not paralyzing, since a direct or reflex action causes contraction of the dilated vessels. The cardiac acceleration seems to be in relation with the fall of the arterial tension; it is observed even when the heart is entirely removed from the influence of the central nervous system. The nitrite of amyl weakens the excitability of the striated muscles. If it is applied directly to the muscle, it destroys all excitability in less than a minute. The author concludes his thesis by an account of the use which has been made of this drug in therapeutics.—*Lond. Med. Record*, Aug. 15, 1880.

The Action of Erythrophleine.

MM. SEE and BOCHEFONTAINE are using erythrophleine, the active principle of the mancona bark, in the treatment of different cardiac and respiratory affections. In 1876, MM. N. Gallois and E. Hardy discovered in the erythrophleum guineense, a leguminous plant, an alkaloid, erythrophleine, which they found to possess poisonous properties, and a remarkable action on the heart. The latter suggested to MM. Sée and Bochefontaine the probability that this alkaloid might be found useful in cardiac diseases. They therefore instituted a series of preliminary investigations into its physiological action, and especially into those effects which could be recorded by the graphical method. They have communicated the results to the Académie de Médecine. They examined first its effects upon frogs, and subsequently those upon rabbits and dogs. The latter series are the most important. Hypodermic injection was chiefly employed. A centigramme, introduced beneath the skin of a dog, had no effect. Twice the quantity killed a large dog in two hours. They found that while one milligramme per kilogramme of body weight had no appreciable effect, a miligramme and a half was fatal in a few hours. The toxic power of erythrophleine appears thus to be about the same as that of Homolle's digitaline. The first sign of the toxic effect consists of restlessness, followed by a period of weakness, and this by vomiting or efforts at vomiting. The latter are the true initial symptoms of the toxic action, and, if the dose of the poison is not too great, they may cease. The animal then quickly returns to its normal condition. The circulatory apparatus is affected in a manner somewhat similar to the digestive. The intra-arterial pressure is increased, the pulse becomes irregular and then retarded. The retardation is characterized by the force of each pulsation, and by the uniformity of the intra-arterial pressure, which is not modified by the respiratory movements, as it is in the normal state. This period is followed by another, in which the pulse is extremely quick and feeble. The influence of the respiratory movements on the blood-pressure reappears, the intra-arterial tension gradually lessens, the cardiac pulsations become weaker and weaker, and cease for a moment from time to time, and are at last permanently arrested. The respiratory movements seem to be directly influenced by the poison, as well as secondarily by the effect on the circulation. At first they are, as a rule, slightly slower and deeper than normal. When the heart's action is accelerated towards the end, the respirations are frequent and extremely energetic. In almost all the experiments the movements of respiration ceased at the same time as those of the heart, but in several cases the movements recommenced, and continued with energy for one or two minutes. The poison has a distinct action upon several parts of the nervous system. Thus faradization of the peripheral portions of the pneumogastric nerves in the neck does not arrest the heart of an animal under the influence of erythrophleine as it does that of a healthy animal, and faradization of the central extremities of these nerves does not accelerate the heart as it does in a healthy animal. Nevertheless, this procedure causes the same rise in pressure as under normal conditions. Immediately after death the heart is found in diastole, flaccid, but full of blood. Sometimes the ventricles present a tremulous movement similar to that which is seen after they have been faradized. Usually the heart has not lost its electrical contractility. The pneumogastric nerve retains its action on the stomach. The excitability of the phrenic nerves is, however, lessened or even lost, while that of the sciatic nerve, and of the sympathetic, is not diminished. We are promised some further observations on the therapeutic uses of the drug.—*Lancet*, July 3, 1880.

Glycerine in Flatulence, Acidity, and Pyrosis.

Drs. SYDNER RINGER and WILLIAM MURRELL find (*Lancet*, July 3, 1880) that glycerine is useful in acidity, flatulence, and pyrosis, and that it sometimes relieves pain, probably by preventing the formation of acrid acids which irritate delicate and irritable stomachs. They suggest that it acts by retarding or preventing some forms of fermentation and of putrefaction, and while doing so it in no way hinders digestion. They administer one or two drachms in water, coffee, tea, or lemon and soda-water, either before, with, or immediately after food. In tea and coffee it may replace sugar, a substance which greatly favours flatulence. In some instances a cure does not occur till the lapse of ten days or a fortnight.

Metallotherapy.

Dr. PETIT (*Bulletin Général de Thérapeutique*, May 15, 1880) reports several interesting cases of nervous affections, in which this method of treatment proved eminently successful. One of these occurred in a boy, aged 14, who suffered from "hysteria" with contraction of the lower limbs, general anæsthesia, and ischæmia. Faradization stimulated the capillary circulation, but did not affect the anæsthesia. The application of gold disks caused within ten minutes a return of sensibility in a zone around the point of application. This zone increased at subsequent sittings, with the result that, at the end of three months, the general sensibility and movement in the lower limbs had become normal. Disks of other metals and of wood had previously been tried, but had produced no effects. The next case recorded is that of a young woman, who had been for four years under treatment for various manifestations of hysteria. Her symptoms were anæsthesia and paresis of the left hand, anorexia, constipation, meteorism, amenorrhœa, and contraction of the flexors of the right leg. She was sensible to gold and copper. Disks of the former metal caused the anæsthesia, hyperæsthesia, and contraction to disappear, but they returned as soon as the metal was removed. Subcutaneous injections of chloroxyde of gold removed the symptoms in two months, but the application of disks caused them to return, a proof that the cure was not definitive. Case XVI. affords a good instance of the efficaciousness of metallotherapy against hysterical contraction. The patient suffered from spasmodic contraction of various muscles, including those of the œsophagus and vagina, in a very exaggerated form. The left arm was contracted during two years; there was general amyosthenia and anæsthesia, together with hyperæsthetic points along the course of the cord. Blood did not flow on puncture of the skin, the hands and feet were constantly cold, while the patient suffered intensely from ovarian pain, insomnia, palpitation, and vomiting. Chloride of gold and sodium internally, and disks of gold placed on the limbs, caused apparently a complete cure, so much so that within a year after the commencement of treatment the patient married. The hysteria was, however, still present, as shown by the fact that, shortly after marriage a most intense vaginismus became developed. This was cured, after the failure of other treatment, by chloride of gold and sodium, and the topical employment of gold cylinders gradually increasing in size. A curious feature in the case was the fact that, simultaneously with the employment of gold anklets, the sensation of intense cold in the feet was no longer felt, the patient being able to dispense with the hot jar which had previously been necessary all the year round. Case XVII. is that of a female, aged 40, who suffered intensely from vesical spasm, and in whom the passage of a catheter frequently occasioned convulsions and syncope. So much did the patient suffer, that she would sometimes remain two or three days without eating or drinking, in order, if possible, to avoid catheterization. In this case gold aggravated the symptoms, while silver and iron had the effect of at once putting an end to them. Within one hour of the application of disks of the above metals, micturition took place spontaneously and without pain. Subsequently, on various occasions, when employed, they always yielded the same successful results.—*Lond. Med. Record*, Aug. 15, 1880.

Creasote as a Therapeutic Agent in Chest Affections.

Dr. REUSS, of Paris, has devoted a good deal of attention to this remedy in phthisis, and has found it very effectual in his dispensary practice, where he was able to give it systematically, and formulate the results. The irritation which it is apt to set up after a time in the air passages, and also in the alimentary canal, he has found in common with others, to be the great drawback to its general employment. He tried it in alcohol, then with cod-liver oil or glycerine, but in all these media he suspected that it was now and then the cause of a dangerous or even fatal exacerbation of throat or intestinal inflammation. He was led eventually to try balsam of tolu, and found it in all respects a safe and effectual solvent, counteracting, as one would expect, the irritating properties of creasote and its tendency to arrest expectoration. It is essential that the creasote be absolutely pure, the test on which he relies being that it does not coagulate collodion. He prescribes it in lozenges (*dragees*), the formula for each being—

Pure Balsam of Tolu,	20 cent.	(3 grs.)
Pure Beech Creasote,	5 cent.	($\frac{3}{4}$ gr.)
Excipient,	q. s.	

Two of these for a dose; given at first night and morning, and gradually increased, sometimes up to ten lozenges in the day. He tabulates the results in twenty cases. Five patients in the first and three in the second stage were apparently cured; three in the first and three in the second stage improved; three in the second stage were unaffected, and one in the second and two in the third stage died. More recently he gives a detailed account of a case which was apparently passing into the third stage when the above treatment was begun. The patient was a stone-cutter, æt. 40. He had been losing flesh for a considerable time, perspired profusely, and had severe cough with fetid purulent expectoration. Liquid râles, with other signs of a like import, were heard in both apices. Dr. Reuss gives an exact and detailed report of the patient's progress over a period of ten months till, on 1st April, he is stated to be regularly at work in the country robust and strong, and with only a slight roughness of the respiratory murmur over the upper part of chest. It must be noted that he took latterly, in addition to the creasote, quinine wine and cod-liver oil.—*Glasgow Med. Journal*, Sept. 1880 from *Journal de Thérapeutique*, August 25, 1879, and May 10, 1880.

MEDICINE.

The Blood in Idiopathic Anæmia.

Dr. J. B. **Bradbury**, in his Address in Medicine at the late meeting of the British Medical Association (*British Med. Journal*, Aug. 14, 1880), stated that he had carefully examined the blood in one well-marked case of idiopathic anæmia,[1] and failed to find the small spherical red corpuscles regarded by Eichhorst[2] as pathognomonic of this disease. Rosenstein, Grainger Stewart, and Bradford have also failed to find these "microcytes;" and they have been seen by Cohnheim in a case of medullary leukæmia, by Dr. Litton in a case of phthisis,[3] and by Dr. Greenfield in a case of Hodgkin's disease.[4] Dr. Osler, of Montreal, has found similar corpuscles in his own blood, and in that of persons free from disease. These corpuscles cannot, therefore, be regarded as diagnostic of essential anæmia; but the three combined abnormal conditions—viz., diminution of the number of the red corpuscles, their paler colour, and the alteration of their shape and size—may be regarded as characteristic.

Antiseptic (Antizymotic) Treatment of Enteric Fever (Typhus Abdominalis).

During a slight epidemic of enteric fever, which prevailed in Altenburg from August to November, 1879, Dr. C. G. **Rothe** was accidentally led to make a series of therapeutic observations, which he has published in the *Deutsche Medicinische Wochenschrift*, Nos. 11 and 12, 1880.

From the middle of August to the end of October, 25 cases came under Dr. Rothe's observation. Of these 25 cases, he treated the first six by the method which he had employed for some years, and which always yielded him satisfactory results. This consisted, during the first days of the disease, of hourly doses of infusion of digitalis (1 in 100), with aconite and tincture of iodine, until a distinct effect on the pulse was produced. With this he used permanent cold wrappings, quinine, or, according to circumstances, salicylic acid in large doses; and, in case of necessity, that is, when the temperature remained continually at or over 40 degs. C. (104 degs. Fahr.), cold baths. Of these six cases, one ended fatally in the fifth week. The patient was a girl 15 years old; the case was complicated with double pneumonia. The remaining were somewhat protracted, four to six weeks elapsing before convalescence was established.

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[1] British Medical Journal, December 30, 1876.

[2] Centralblatt für die Medicinischen Wissenchaften, June 24, 1876.

[3] London Medical Record, 1877, p. 120.

[4] Clinical Society's Transactions, vol. x. p. 52.

On the 17th September, Dr. Rothe received the seventh case for treatment. The patient, a gardener, aged 28, had a high morning temperature of 40.5 degs. C. (104.9 Fahr.). Pulse, 110; he had been ill two days. Digitalis and cold wrappings were ordered. On the 19th of September, the temperature was 40.7 degs. C., the pulse 120. As severe diarrhœa had occurred during the night, for which Dr. Rothe had for years almost exclusively used the carbolic acid and iodine, in the cases of adults as well as of children, unless some particular indications required a different treatment, he added to the infusion of digitalis (1 in 200), carbolic acid and rectified spirit, of each 75 centigrammes, and 15 drops of tincture of iodine. The patient was directed to take a tablespoonful every hour, and the wrappings were continued. On September 20th, temperature 38.6 C. (101.48 Fahr.), pulse 84; the spleen was slightly swollen. There had been no more diarrhœa during the night. The patient had no thirst, and slept quietly. The patient was ordered to take the medicine hourly during the day; the wrappings were applied only in the afternoon. The subsequent progress of the case was one of steady improvement. The digitalis was omitted on September 22d. For several days afterwards the temperature varied in the morning between 37.4 and 38 degs. Cent. (99.3 and 100.4 Fahr.), in the evening up to 38.5 degs. Cent. (100.5); the pulse between 52 and 58. From October 4th, the evening temperature was also normal. The medicine, which had been not so often given, was now discontinued; and on October 10th the patient left his bed, and quickly recovered. The extraordinary effect of the medicine on the vascular system was here such as Dr. Rothe had never before observed under the use of digitalis alone, in such small doses. Although he had used it in all febrile diseases, in combination with tincture of aconite, he has never seen the pulse fall below 80 to 72; he was, therefore, inclined to consider the whole phenomenon as an accident, until he had an opportunity of observing the following case:—

A woman, aged 36, came under treatment on September 19th, after having been very unwell for several days. The temperature in the afternoon was 41 degs. Cent. (105.8 Fahr.); the pulse 112; tongue covered. She had severe headache. Dr. Rothe gave her carbolic acid and iodine, with tincture of digitalis and tincture of aconite, every hour, and had wrappings applied, the compresses being changed every quarter of an hour during the day. On September 20th there was improvement; the evening temperature was 39 degs. Cent. (102.2 Fahr.); the pulse 82. On the 21st, the medicine was given without digitalis. The improvement continued; the temperature and pulse fell steadily. On September 26th the temperature was 37.4 degs. Cent. (99.4 Fahr.); and the pulse 64. From this time the temperature did not exceed 38 degs. Cent. (100.4 Fahr.); and, on October 5th, the patient was convalescent.

The tongue assumed in none of the observed cases that dry, brown, hard, and crusty surface, which is usually a constant symptom in severe cases; and the gastric symptoms subsided at the latest in the beginning of the second week, being following by moderate appetite, and a feeling of comfort. Rothe draws attention especially to this condition, in order to ascertain, by further experiments, whether this is also an invariable result of the combinations of carbolic acid and iodine. The effect on the fever seems to take place, sooner or later, between two and ten days, according to the intensity of the infection (general symptoms); and Rothe has, therefore, increased the doses a little, *i. e.*, from one gramme each of carbolic acid, rectified spirit, and the tincture of iodine, to 120 grammes of mixture, of which one tablespoonful is given every hour; so that, after two to three weeks' uninterrupted administration, toxic symptoms always occurred. Quinine was not given in any case.

Rothe observes that a comparison of the recited cases of the disease shows that all came under treatment with high morning temperatures (mostly 40 deg. Cent., 104 Fahr., and above), and that in all alike, first the pulse, and then the temperature sank, within from two to seven days; the pulse frequently below the normal, without ever rising to its former height, except when the medicine was discontinued, or given less frequently by way of experiment. That this remarkable phenomenon is not attributable to the digitalis, he does not doubt; for, in the first instance, he has never seen such a constant and lasting diminution of the pulse, from small doses of it, especially in typhus; and, secondly, it was, in all cases, only added to the first bottle of medicine, and was then omitted, and yet the effect was very striking during the later stage, and ceased immediately when the mixture (iodine and carbolic acid) was discontinued. The cold wrappings were continued, in all cases, only for a few days, until the temperature did not exceed 39 deg. Cent. (102.2 Fahr.) permanently; and when it is remembered how little they were able, generally, to effect a lasting and sure cessation of the fever—for instance, in two of the first six cases, in spite of uninterrupted application[1] during the three or four weeks—they do not afford an explanation of the uniformity of the course.

The assumption of deception, or of accident, would indeed be somewhat forced in nineteen cases, which ran such an uniform course, one after another. Nothing then remains but to ascribe an intense "antipyretic" action to the combination of iodine and carbolic acid. Whether this occurs in enteric fever only, or also in other febrile infective diseases, remains to be proved. Dr. Rothe has only had an opportunity of trying it in a case of puerperal endometritis with high fever, and with exactly the same result (with simultaneous local medication); the temperature and pulse had fallen on the third day from 39.8 deg. Cent. (103.6 Fahr.), and 112 to 37.5 deg. Cent. (99.5 Fahr.), and 68, and did not rise again.

How can this "antipyretic" effect be explained, if it be true? Does a direct influence on the vascular activity take place, as with the digitalis, through stimulation of the vagus or of the cardiac ganglia? or is the cessation of the fever a secondary result, its cause being gradually removed or overcome? Dr. Rothe thinks that both explanations are valid. The febrile action in enteric fever is undoubtedly in direct proportion to the morbid process in the small intestine, the seat of the local, and the source of the general infection. With this centre of infection, the iodine and carbolic acid, being hourly introduced, comes into more or less direct contact, especially after previous evacuation of the intestine; and then the question arises as to a direct development of the antiseptic—the bacterium-destroying—quality of this remedy. In this way the following facts might be explained. 1. A much longer time is required for the manifestation of its effect, if the general symptoms indicate great intensity of the local injury and the general affection. 2. After a partial intermission of this treatment, the febrile symptoms again at once become more acute. Since, however, the fall of the pulse preceded mostly the lowering of the temperature, and remained often at or under the normal for weeks, while the temperature varied between 38 and 39 deg. Cent. (100.4, and 102.2 Fahr.), it cannot well be doubted that there is a direct influence on the heart, after the manner of narcotics. Nevertheless, the pulse differs from the digitalis-pulse in not becoming irregular and intermittent.

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[1] Dr. Rothe usually makes the wrappings permanent. The patient is laid on a wide sheet reaching from the axillæ to below the knees, which has been wrung out in cold water, and spread over a large woollen blanket; he is then wrapped in both, so that the feet alone are covered directly by the warm blanket. At intervals of ten or twenty minutes, another cloth, also reaching below the knees, but covering the patient only in front, is dipped in cold water and laid over, which remains until evening. By this, the shock is avoided, which is always unpleasant to the patients, and which disturbs their rest. They often continue to sleep quietly during the change of the outer cloth: the temperature is kept from the beginning at a moderate height (30 to 40 deg. Cent.), without any abrupt fall or rise. The envelope is, as a rule, removed during the night.

Another peculiarity in the course of the disease must be pointed out. All the patients, after the first days, as soon as the gastric symptoms had subsided, asserted they felt quite comfortable; and this subjective feeling lasted uninterruptedly to their convalescence. The latter also, in all, went on without disturbance, and without interruption by those troublesome slight relapses, which frequently seem to indicate, in the fourth or fifth week, some recrudescence of the local lesion.

The medicine itself is readily taken by the patients, both children and adults; and, indeed, for weeks; which cannot be said either of quinine or of salicylate of soda. Oil of peppermint completely disguises the disagreeable smell; and gastric or sensorial disturbances, which sometimes attend the use of the above-mentioned remedies, were never observed. The medicine has also the recommendation of cheapness, a very important circumstance in view of the present high price of quinine. It seems important that the remedy should be given in sufficient quantities (1 to 2 of carbolic acid, and 1 of tincture of iodine, in 120 of water), a tablespoonful being given hourly, until a decided effect on the pulse and temperature is produced, and then every two hours, until apyrexia follows; and it should be continued for three or four weeks. Whether the carbolic acid, without iodine, has the same effect, Dr. Rothe does not know. For the last ten years he has used the combination of carbolic acid with iodine in phthisis, diphtheria, diarrhœa, etc., and has never ventured to give up its use.

Dr. Rothe says that he would not have ventured to publish the results of a small number of observations, if it were not for the desire that they should be repeated, and confirmed or corrected. He hopes that his professional colleagues, if they think the treatment worth a trial, will publish the results of their observations.—*London Med. Record*, Aug. 15, 1880.

Action of Benzoate of Soda in Scarlet Fever and true Diphtheria.

Dr. DEMME makes the following statement in the yearly report of the Children's Hospital at Bern (*Allegemeine Weiner Medizinische Zeitung*, No. 24). He has treated twenty-seven cases of diphtheria with benzoate of soda internally and externally. Internally, as large a dose as possible was given (5 to 20 grammes daily, dissolved in 100 to 125 grammes of water, with the addition of 1 to 1.5 grammes of liquorice juice). The external application was made by sprinkling the diphtheritic patches with alcoholic solution of benzoate of soda by means of an ordinary laryngeal insufflator. The applications were repeated every two to four hours. If the local disease were spreading rapidly and the lymphatic glands of the throat were swollen, Dr. Demme injected benzoate of soda into the retromaxillary and submaxillary regions, and even into the swollen tonsils. Cold wrapping of the body was employed at the same time for the lowering of the temperature, and cooling baths when there was severe fever. In septic forms of the disease, he administered cognac (5 to 75 grammes daily). Of the twenty-seven cases which were treated in this manner, six, or 22 per cent., died, which must be called very favourable when the severity of the cases is considered. With regard to the special effect of benzoate of soda, Demme arrives at the following conclusions. 1. Benzoate of soda is an effective antimycotic, both as an internal and as an external application. 2. The application of benzoate of soda, in the form of insufflation on the infected spot, favours the section of the mucous membrane and essentially promotes the separation of the diphtheritic deposit. 3. A reduction of temperature is not produced by benzoate of soda. 4. In all his cases, Demme saw under the continued use of benzoate of soda an increase in intensity of the contractions of the heart, generally with diminution of their frequency, and increased discharge of urine. 5. Benzoate of soda had no effect on nephritis, with regard to the secretion of albumen. The doses, which produce a good effect in diphtheria are, according to Demme, the following: for children from 3 to 6 months old, 2½ grammes daily; from 7 to 12 months, 5 grammes; from 1 to 2 years, 7.5 grammes; from 3 to 7 years, 12 to 15 grammes daily. Demme never observed unpleasant symptoms after such doses.—*Lond. Med. Record*, August 15, 1880.

Treatment of Diphtheria by Carbolized Camphor.

M. PERATE has for the last two years used carbolized camphor for the treatment of diphtheria. He paints the surface with a pencil dipped in the following mixture (*Bulletin de Thérapeutique*, July 15): Carbolic acid, 9 grammes: camphor, 25 grammes; alcohol, 1 gramme, diluted with equal parts of oil of sweet almonds. The paintings are made every two hours in the day, and every three hours in the evening; then, after some days, they are divided by periods of three. four, or five hours, according to the improvement of the patient. These paintings are made over the whole extent of the false membranes, and with troublesome children the pencil is plunged as deeply as possible to the bottom of the throat, being, of course, previously drained. The mixture has an extremely disagreeable taste, to which, however, the patient soon becomes accustomed. M. Peraté has been very successful with this plan of treatment.—*Lond. Med. Record*, August 15, 1880.

Treatment of Whooping-Cough by Benzoate of Soda.

Dr. EDWARD TORDEUS has given benzoate of soda with successful results in four cases of whooping-cough; he used the prescription recommended by Letzerich, of which the formula is as follows (*Journal de Médecine de Bruxelles*, May, 1880): benzoate of soda, 5 grammes; distilled water and peppermint water, of each 40 grammes; syrup of orange peel, 10 grammes; take two fluidrachms about every hour. M. Tordeus believes himself to be authorized to conclude that benzoate of soda has a favourable action on whooping-cough, of which it diminishes the violence and frequency of the fits. It also possesses the advantage of acting on the respiratory mucous membrane, and thus preventing the manifestation of the pulmonary symptoms which unfortunately often supervene in the course of whooping-cough, and convert it into a serious affection.—*Lond. Med. Record*. August 15. 1880.

Secondary Syphilitic Epilepsy.

M. FOURNIER states (*Annales de Dermatologie et de Syphiligraphie*, Nos. 1 and 2, 1880) that his object in publishing the following cases is to establish the fact that certain symptoms of an epileptic character do sometimes occur during the secondary stage of syphilis, and especially during the early part of this stage. The symptoms are very different from those which occur during the tertiary period, as regards significance, evolution, and gravity.

CASE I.—A young woman of fair constitution and previous health was admitted into the Lourcine Hospital on account of secondary lesions of the vulva and mouth. Some weeks later there occurred a severe outbreak of cutaneous syphilis, with enlargement of the glands, affections of the periosteum, headache, insomnia, etc. Suddenly there appeared a series of peculiar attacks, some of which were witnessed by M. Fournier, and of which he gives the following description. "The countenance suddenly assumes an extraordinary indescribably stupid expression. The head is turned from the left side. The left upper extremity is suddenly raised towards the face, the wrist and fingers being strongly flexed. The lower limb of the same side is forcibly extended. The whole body, in short, is rotated from right to left. The phenomenon lasts a few seconds; then violent clonic spasms affect the left upper limb. Finally, the patient for some minutes longer remains stupid, stunned, and unconscious, and the fit is at an end." During several days these fits were repeated, but very soon there appeared attacks of general convulsive epilepsy in every respect resembling the *haut mal.* There were a large number of such attacks during the first month. In the second month there were five fits, and only two during the next two months. Under energetic specific treatment the cutaneous and other lesions disappeared; the epileptic attacks also ceased, and did not return.

CASE II.—A strong young woman of good constitution was found, on admission, to be suffering from chancrous induration of the labium, with inguinal adenopathy, roseola, lesions of the tonsils, and general analgesia of the skin and mucous membranes. She had not undergone any treatment previously. Some days after admission the patient was seized during the night with a violent convulsive attack. She was found to be unconscious, foaming at the mouth, and in a state of convulsion like that of the *haut mal.* After the fit she fell into a deep sleep. A second fit occurred about a quarter of an hour later, followed by involuntary evacuation of the bladder, and an almost comatose condition, which lasted until the following morning. The next day M. Fournier found the patient somnolent, and incapable of answering questions. The excitement of the examination, however, brought on another fit, which was carefully observed by M. Fournier, and found to present all the characters of ordinary epilepsy. The next day consciousness was fully regained, and the patient then affirmed that she had never before suffered from any attack of the kind, nor from any nervous disorder. Minute examination failed to reveal any other cause than syphilis. Protoiodide of mercury had already been prescribed, and was continued without any other medication; the effect being that the roseola and other signs of syphilis quickly disappeared, and the fits did not return. Three months later the patient was discharged in good health, but was seen on several occasions during a year afterwards for various slight syphilitic symptoms. There had been no return of the epileptic seizures.

CASE III.—A robust young man, aged 25, of nervous temperament, contracted syphilis in 1867. In the secondary period, between the third and sixth months, he had three well-marked attacks of epilepsy. There was no hereditary tendency, and no other cause except syphilis could be ascertained. Under specific treatment the external signs of syphilis disappeared, and there was no repetition of the epileptic attacks. Thirteen years have now passed without any reappearance. These three cases, with about a dozen others observed by the author, prove, in M. Fournier's opinion, that symptoms of the nature of epilepsy may occur during the first few months of syphilis. M. Fournier looks upon this secondary epilepsy as being a *specific neurosis;* that is to say, it consists of a group of morbid symptoms developed under a specific influence, but occurring probably without any lesion of the nervous centres.—*London Med. Record*, Aug. 15, 1880.

Bromide of Ethyl in Epilepsy.

M. D'Olier, in the names of M. Bourneville and himself, communicated to the Société de Biologie (*Gaz. Hebdomodaire*, Août 6, 1880) the results of researches pursued during two months on the action of bromide of ethyl in hysteria and epilepsy. 1st. In the cases of hysterical patients the attacks have been almost constantly suppressed when the drug was administered at the beginning of the attack.

2d. In cases of epilepsy, the attack being at the tonic period, the action of bromide of ethyl was manifested, in some cases, by the cessation of the convulsions and the production of a complete muscular resolution; the attacks have often appeared to diminish in intensity and duration; sometimes the effect has not been appreciable.

Duboisia in the Treatment of Exophthalmic Goitre.

M. Dujardin-Beaumetz has substituted duboisia by hypodermic injection for atropia in the treatment of goitre. In the two cases in which he employed duboisia, he obtained a great diminution of vascular palpitation and pulsation; in a word, a notable improvement. He has also noted an early cumulative action, although he injected only weak quantities of duboisia, a quarter of a milligramme, or a half milligramme at most. At the end of a few days there appeared undoubted signs of toxic action similar to that produced by belladonna. The treatment must be interrupted every eight days, and discontinued for some days, and it must not be continued too long. The solution which serves for injections may be prepared as follows: Neutral sulphate of duboisia, 1 centigramme; distilled cherry laurel water, 20 grammes. Each syringeful of one cubic centimetre contains half a milligramme of the salt of duboisia.—*Bulletin Gén. de Thérapeutique*, Juillet 30, 1880.

Iodoform in the Treatment of Goitre.

Dr. Boéchat believes that iodoform, dissolved in sufficient quantity in some indifferent fluid, may be successfully employed in the treatment of goitre. In injecting into the tumour better results are attained than with the tincture of iodine, and there is no fear of the subsequent complications so frequently met with after the employment of the latter method, and which are due to the formation of cicatrices, owing to the action of the alcohol upon the tissue of the thyroid body. The chief objection to the use of iodoform has always been its acrid and penetrating smell. This objection when employing it for external use, Dr. Boéchat has sought to overcome in the following manner. The iodoform has been finely powdered, and has then been intimately mixed with glycerin, the mixture being applied to the goitre. As soon as it has begun to dry the part is painted over with collodion, which dissolves a small quantity of the iodoform by means of the ether which it contains. The plan is not very successful, however, as it only masks a part of the odour. The application is to be made every two or three days. In cases of goitre of long standing, and in cystic and parenchymatous forms, no results have been obtained by this method of treatment, but in the cases of young patients, and in goitres of recent growth which consisted of soft non-fibrous swellings, very marked results were obtained; the goitre disappearing more rapidly than with iodine or potassium iodide. Iodoform administered in internal doses of pills, each containing 0.01 gram, to the extent of ten pills per diem, has not given any very satisfactory results. — *Practitioner*, Aug. 1880, from *Correspondenz Blatt. f. Schweiz. Aërtzte*, Jan. 1, 1380.

Syphilitic Laryngitis in Children.

EROSS remarks that syphilitic laryngitis in children offers essential differences from the same affection in adults; the prognosis being more unfavourable, and the course more rapid. He reports the following case (*Wiener Medizinische Wochenschrift*, July 3d, 1880). A child, three and a half years old, had suffered from whooping-cough for six months, and during that time had developed a scaly eruption of a transitory nature. On admission in November for suffocative dyspnœa a condyloma was found near the anus, and mucous patches were present in the corners of the mouth, on the inner surface of the lips, and on the tonsils. The mucous membrane of the nose was inflamed and injected; the glands in the neck and in the submaxillary and inguinal regions were enlarged. The hoarseness which began with the whooping-cough had increased until it amounted to aphonia, and there were now frequent suffocative attacks and convulsive fits of coughing. Laryngoscopic examination discovered the epiglottis thickened and three or four times its natural size; the ary-epiglottidean folds were thickened and pale-red; the left vocal cord was more than twice as thick as the right; and at its free edge bulged out towards the opposite cord; both were of yellowish red colour. There can be no doubt that the laryngeal affection was only a part of the general constitutional syphilis, which was abundantly evidenced by other symptoms and by the result of the treatment (mercurial inunction). In two months and a half the child was almost quite well, although when admitted tracheotomy seemed urgently called for.—*London Med. Record*, August 15, 1880.

On the Treatment of Bright's Disease, with Special Reference to the Use of Diuretic Remedies.

Dr. W. T. GAIRDNER, Professor of Medicine in the University of Glasgow, contributes an interesting paper on this subject to the *Glasgow Medical Journal*, Sept. 1880, in which he shows that in almost all stages of the disease, there has been an undue tendency to depreciate or exclude diuretic remedies, and that these judiciously employed, without pretending to an absolute supremacy, are at once the safest, and in many cases the most effectual of the means of dealing with dropsical symptoms, while, as Dr. Christison has pointed out, their legitimate function is not merely to get rid of a single symptom, but by aiding the natura process of excretion by the kidneys, to ward off the dangerous accumulations in the blood, which lead in time to what is called uræmia. To restore by remedies this natural function, we must needs employ, in any case, methods of elimination that are more or less closely allied in their action to the physiological processes which it is desired to arouse and quicken; and hence, as he ventures still to be of opinion, the experience of ages, here quite in accordance with a sound theory, has practically demonstrated the advantage of employing in such cases the cream of tartar in its solid as well as liquid forms of administration, followed or accompanied by other mild diuretics, or by digitalis; a mode of practice extending back, as we have seen, to the last century, if not to much earlier periods, and only apparently discredited by prejudices arising from the pathological researches of Bright. As to the employment of tonics, nutrients, chalybeates, and other hæmatics in the later stages, there is practically an universal consensus of opinion.

Ascites Chylosus.

An instance of this extremely rare pathological condition was under discussion at a meeting of the Berliner Medicinische Gesellschaft, held on 12th May, 1880.

At that meeting Dr. P. GUTTMANN showed a specimen of a milky-looking fluid which he had removed, by puncture, from the abdomen of a boy aged 10. The patient had enjoyed perfect health till three years ago, when fluid began to collect in the abdominal cavity; in February, 1880, this fluid, which had the same general characters as that exhibited, was removed by v. Langenbeck. In the following April Dr. Guttmann repeated the operation, withdrawing 6350 grammes of fluid. When examined, this was found to contain abundance of fat and albumen; under the microscope it was seen to consist of innumerable fine molecules which, on the addition of ether, ran together into unmistakable fat drops. It was, in fact, simply chyle. Fourteen days later the patient was seized with severe pains in head and neck, became drowsy, and died on 4th May. An abscess as large as a walnut was found in the posterior half of the left occipital lobe of the brain; there was also non-tubercular meningitis in the region of the medulla oblongata. In the abdominal cavity were 2000 grammes of the milky fluid already described. With the exception of chronic non-tubercular peritonitis, which had given rise to extensive adhesions of the intestines to each other, and to neighbouring structures, the abdominal organs presented nothing abnormal. No distension of the lacteal vessels was discovered; but the patient had for several days taken no food. The thoracic duct in its whole length was empty and quite pervious. From these facts Dr. Guttmann formed the opinion that in this case the transudation of chyle was not caused by compression or obstruction of the lacteals, but by actual disease, and consequent undue permeability, of the walls of those vessels. The chylous transudation was neutral in reaction, of sp. gr. 1022, and without smell. Under a magnifying power of 350 diameters it showed almost nothing except extremely fine and closely packed granules, with a very few round cells. It was, therefore, obviously chyle which had not passed through the lymphatic glands, otherwise the number of round cells (lymphatic corpuscles) would have been much greater. Chemically, the fluid was found to contain 5.25 per cent. of fat, which solidified at the ordinary temperature; it also contained 3.5 per cent. of albumen. This latter fact is of physiological interest, as it proves that all the albumen introduced into the stomach is not transformed into peptone, but that a certain proportion of it passes unchanged into the chyle. No trace of peptone or of saccharine ferment was found in the fluid. It is here noted that all the cases of this diseased condition hitherto published (very few in number) are collated and summarized by Quincke, in an article on "Fatty Transudations," in *Deutsches Archiv f. Klin. Med.*, vol. vi.; in his own case and in all the others the transudation was invariably found to be dependent either on perforation or on compression of the lacteals.—*Glasgow Med. Journal*, Sept. 1880, from *Berliner Klin. Wochenschrift*, No. 29, 1880.

Oxide of Zinc in Diarrhœa.

M. COUSIN publishes in the *Marseille Médical*, a paper which confirms the excellent results obtained by Gubler and Bonamy from the use of oxide of zinc in diarrhœa. The majority of cases treated were obstinate and chronic, characterized by abundant and numerous dejections; some were due to simple intestinal catarrh, whilst others were caused by improper food or by cold, others again being symptomatic of tuberculosis. In each case various remedies (opiates, astringents, anti-cathartics, etc.) had been employed without result. M. Roux resorted finally to oxide of zinc, which yielded marked and rapid effects; thus diarrhœa of six, four, and three months' standing, was favourably modified within a few days after the administration of the first doses of this remedy. The formula employed, which is the same as that of Gubler and Bonamy, is as follows; Oxide of zinc, 3 grams 50 centigrams; bicarbonate of soda, 0 grams 50 centigrams

Make into four powders, one powder to be taken every three hours. The union of the soda bicarbonate with the oxide of zinc causes the latter to be more readily tolerated.—*Practitioner*, Aug. 1880, from *Le Progrès Médical*, July 3, 1880.

SURGERY.

Perforating Tuberculosis of the Roof of the Skull.

R. VOLKMANN (*Centralblatt für Chirurgie*, 1880, No. 1) has had the opportunity of observing about twelve almost typical cases of this comparatively rare affection. It consists in a process of caseation leading to melting and necrosis of the cranial bones, together with purulent separation of the dura mater, as well as of the external periosteum, which, however, always affects only one spot of the roof of the skull. A tolerably large abscess is formed externally, mostly with ill-defined symptoms; its internal surface, after spontaneous or artificial evacuation of the cheesy pus, was lined with numerous granulations concerning caseous miliary tubercles, the bony tissue being also of cheesy consistence at a spot as large as a pea, often in the form of a small sequestrum, of the entire thickness of the cranium. If left alone, the diseased parts heal extremely slow, the caseous change may progress, and in many cases pus is accumulated between the cranium and dura mater. The author has, therefore, in four cases, after freely laying open and evacuating the external abscess under antiseptic precautions, trephined the affected bone, and scraped out the dura mater as far as it was fungous. The result has been very favourable with regard to the course of the wound. The true healing, however, was very protracted in half of the cases thus treated. The cranial integument, which had been detached by the abscess, always united directly.—*London Med. Record*, August 15, 1880.

Extirpation of a Naso-pharyngeal Polypus by the Palatine Method.

This case was communicated by CRUVEILHIER at the Société de Chirurgie de Paris (*Bulletin et Mémoires*, April 5th, 1880). A young man aged 17 had suffered for over two years from obstruction of, and frequent hemorrhage from the right nostril. On examination, a tumour was found occluding the right nostril and filling the posterior part of the nasal fossæ, where it could be felt by introducing the finger behind the soft palate. The palatine arch appeared convex. There was no deformity of the face, nor protrusion of the right eye, but there was some slight epiphora. The palate was divided in the middle line, exposing the polypus, which was then seized by the forceps and extracted. The hemorrhage was so excessive that the patient fainted. The polypus was very large, and presented two distinct lobes; one was attached to the pterygoid plate of the sphenoid, the other to the basilar process of the occipital bone, which was so eroded that it was feared the tumor had penetrated into the interior of the skull. The patient progressed steadily, and was discharged a month and a half afterwards. The gap in the palate, which extended almost as far forwards as the anterior palatine foramen was closed about a year after the operation by Fergusson's method. Owing to the constant flow of mucous down the back of the throat, which had existed since the extraction of the tumour, the union did not take place by the first intention; but, by bringing the granulating surfaces as much into contact as possible, and filling up the gap that remained with the uvula, a restoration of the palate was finally accomplished.—*London Med. Record*, August 15, 1880.

Treatment of Carbuncle of the Upper Lip.

In a malignant carbuncle of the upper lip, which had grown larger in spite of incisions, **Lindemann** (*Archiv für Klin. Chirurgie*, Band xxiii.) succeeded in obtaining a favourable course, by means of numerous punctures with a tenotome, and hourly injections of a two per cent. carbolic solution, at the edge of the diseased part. When the induration and swelling ceased, after three days, the punctures were discontinued, and only one injection made every three hours.—*London Med. Record*, Aug. 15, 1880.

Intestinal Concretions removed by Enterotomy.

At the meeting of the Surgical Congress in Berlin in April, Dr. **Langenbuch** showed some large concretions which he had removed from the stomach and small intestine of a man by enterotomy. The patient had often suffered from attacks of ileus, which had been stopped by enemata of iced water. He was subjected to enterotomy by Herr Langenbuch in a similar attack which could not be removed by these means. Herr Langenbuch found a swelling in the jejunum, laid open the intestine, and took out the mass, which was compressed into the intestine below the stomach. Vomiting continued, and the patient died a few hours after the operation. The necropsy revealed a second, still larger, mass in the pyloric region of the stomach. Examination of the tumours by Herr Virchow showed that they consisted almost solely of organic substance, and especially of the derivative of the bile-acids known as dyslysin. In answer to a question by Herr Esmarch, Herr Langenbuch added, that neither of the coprolites contained any carbonate of magnesia. It was remarkable that they were not found in the large intestine, but in the jejunum and in the stomach.—*London Med. Record*, Aug. 15, 1880.

Case of Extirpation of the Kidney.

Dr. **Fred. Lange** reports (*Medical Record*, Aug. 7, 1880) an interesting case of a Hungarian lady, aged 47, who came under his care suffering from severe attacks of pain which were associated with a large, slightly movable tumour of the right kidney. The urine contained an abundant deposit of pus and numerous epithelia of the kidney, similar to white blood-corpuscles, but a little larger, presenting a distinct nucleus. The disease was diagnosticated as pyonephrosis. Six months after coming under observation she fell into a feverish state, had severe, persistent pain, extreme tenderness on pressure against the tumour, which seemed to her to be larger, and for the first time, heretofore observed, the urine became quite clear, containing only a trifling quantity of sediment. Nothing was more probable than to assume that the ureter now was completely or almost completely obstructed, and that the urine was discharged from the other side. It was furthermore probable that from the right kidney essentially the sediments might be furnished, and that it might not have any importance for secretion of urine, because the urine secreted during this attack, like those before, presented the same quantity as in the free intervals; and, finally, it was probable that the kidney assumed to secrete the urine during this attack must be essentially healthy, because the urine did not present any considerable abnormity. The attack of pain just mentioned ended in a very typical and characteristic manner. First, somewhat more sediment appeared in the urine. The following day the patient felt a little relieved. Twenty-four hours later a considerable mass of pus was discharged, and the patient felt again entirely relieved.

Dr. Lange proposed an exploratory incision, and, in case he should find the organ diseased in such a way that its further presence might include danger to life, he had in view its removal, in the supposition that its condition was such as to allow extirpation. Otherwise, he proposed to open the organ supposed to be in a state of cystic degeneration, and to establish a fistula of the pelvis of the kidney. After making the necessary incisions, Dr. Lange found the right kidney in a state of cystic degeneration. The pelvis was apparently not enlarged, nor could he distinguish any calculous matter by the touch. The whole organ seemed to have been somewhat displaced, its lower edge being too near the middle line, while the upper pole was directed outward; perhaps also it was situated altogether a little lower down than normal. He concluded that it was especially diseased, and being under the impression that the other kidney was healthy, and that the right kidney was accessible to extirpation, though with difficulty, he decided to choose the radical way and to remove the organ. To incise the cystic part and to establish a fistula of the pelvis of the kidney he regarded as being too dangerous, on account of the deep seat of the cystic cavities near the vertebral column. It would have been impossible to secure free discharge of the purulent matter and urine from that spot, and to prevent it from infiltrating the retroperitoneal tissue. On the other hand, it was rendered doubtful whether the abnormities in the upper part of the organ, the latter being left, might not be apt to cause trouble by themselves. Finally, there was suggested by one of the colleagues present that he probably had to deal with a new growth, and, in assuming the possibility, he hoped to give the patient the best chance at all events in removing the kidney, always being confident of the integrity of the other kidney. The former was slowly and carefully loosened from its environs, mostly by the fingers, here and there stronger adhesions had to be separated with scissors. Almost the whole hand had to be introduced into the wound to reach the extreme edges of the kidney. Finally, the pedicle was tied in four portions by double ligatures, and the organ removed. The wound was thoroughly washed with antiseptic fluid, drainage-tubes were introduced, no sutures applied, and a large antiseptic dressing concluded the operation, which had lasted about one hour and a half. The loss of blood was quite insignificant. The quadratus lumborum had to be cut across half-way to allow a free outlet to the secretions.

The patient, after several hours of a collapsed appearance, presented a good condition, complaining merely of pain in her back and right hip. In the afternoon nausea and vomiting occurred several times. Pulse became full and strong, face flushed, slight perspiration all over the body. Not a drop of urine was found in the bladder until her death, which occurred on the fourth day, eighty-four hours after the operation. Temperature never exceeded 100.5° F. in ano. Her pulse on the second and part of the third day was abnormally full and strong, mostly 70 to 80 in number. After the third day patient became restless, a little soporous, without losing consciousness. The pulse became more frequent and weak, and finally she died rapidly in a state of coma, the face being congested until a short time before her death. Vomiting, which had been frequent within the first two days, gradually stopped, and only nausea remained. Respiration became deep and noisy. Believing that the case was one of simple anuria, Dr. Lange tried to stimulate perspiration, but the post-mortem on the fifth day after the operation proved that the removal of the kidney had deprived the patient of her only means of existence.

The left kidney, which was removed by autopsy, consists of several cystic cavities, two of which contained a fluid-like urine; one of about the size of a hen's egg was filled with thick cheesy matter. There is no trace of tissue of the kidney left. The pelvis of the kidney is entirely obliterated, and so is the ureter. Probably, for a number of years, no urine has been secreted from this organ. The disease which caused this degeneration might have occurred in the patient's earliest childhood, at least she could not remember having had any trouble in this side. The organ was at its normal place, and, although cystic, it was only slightly increased in size, and its shape was not materially changed from the normal. The other kidney, the right one, which had been removed by operation, was about double the size of a normal one, and is now much smaller than at the time of the operation, when it was filled with blood.

Dr. Lange omitted, in making the diagnosis before the operation, to palpate for the other kidney through the rectum. The result of this examination might probably have corroborated his opinion about this organ, since it was present at its normal place, and in about normal shape and size. He had it immediately under his finger at the moment of the autopsy, and still was not able to decide about its diseased state before he had removed it.

He regrets not having tried the catheterism of the ureter. Post-mortem was allowed only with reference to the kidneys, and the bladder, therefore the ureter was not seen ; so he is unable to say whether or not it was obliterated at its entrance into the bladder as it was in its uppermost part near the pelvis.

Dr. Lange thinks an exploratory lumbar incision on the left side would have been the safest way to make out the diagnosis as far as the kidney of that side was concerned. Regarding the attacks of pain in the right side, there is, he thinks, no doubt that they were caused by retention of the purulent fluid within the cysts ; perhaps in consequence of obstruction of their outlets by small concretions, found post-mortem. The latter he never found in the sediment of the urine.

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Gurgun Balsam in Gonorrhœa and Vaginitis.

This balsam, which is extracted from various dicotyledonous trees, is turbid and of a brown colour, bitter, smelling like copaiba but with a less unpleasant odour, whilst it is less acrid and less expensive than this drug. It is also more readily tolerated. After being in use for a long period in India, its properties were carefully examined by M. Vidal in Paris, as well as by M. Mauriac and M. Malley. The balsam is administered in capsules or in the form of an emulsion in mucilage. In the latter form Vidal gives 4 grams a day, immediately before meals; in larger doses of 10–12 grams it produces vomiting and diarrhœa. It can be prescribed at the beginning of a gonorrhœa, which it cures in 15 to 20 days; it is better, however, to employ it when the inflammatory stage is over, but it is also very useful in gleet. In the female it is used as a local application, the vagina being first washed out with warm water, a plug of cotton-wool soaked in a liniment of equal parts of balsam and lime-water is applied by means of the speculum, and the plug is then covered with a second one of dry wool, the dressing being renewed daily. This proceeding is attended with a slight smarting which disappears after the third application.—*Practitioner*, August, 1880, from Bouchut's *Compend. Ann. de Thérap.*, June, 1880.

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Retention of Urine in Gonorrhœa.

In a clinical lecture on this subject, published in *Le Progrès Médical*, April 17th, 1880, M. Mauriac discusses the forms and the appropriate treatment of retention of urine due to gonorrhœa, the remarks being suggested by the case of a man admitted into the Hôpital du Midi, who had suffered from retention for eight days. Retention during gonorrhœa may present itself under two different forms. 1. *Instantaneous and complete retention.* In this variety the patient, after some such exciting cause as excessive drinking, sexual intercourse, or too much exercise, on trying to pass urine fails altogether to expel the smallest quantity. 2. *Progressive and incomplete retention.* The passage of urine, instead of being abruptly suppressed, undergoes a progressive diminution. The stream becomes gradually smaller, then stops suddenly, to recommence an instant later. The bladder is thus irregularly and often incompletely emptied. This state of things goes on from bad to worse, until at last complete retention is produced as in the first variety. The pain in retention is principally in the hypogastrium and perineum, extending backwards towards the anus and forwards to the end of the penis. Retention does not generally occur during the first weeks of a gonorrhœa, because the inflammation still remains limited to the spongy portion of the canal. Dysuria is common enough early, and is due to inflammatory thickening of the mucous membrane and partly also to the pain caused by micturition. It is at a more advanced stage, when inflammation has reached the membranous or prostatic urethra, and the discharge has become serous or muco-serous, that retention comes on; it is generally excited by some such cause as those mentioned above, but sometimes none can be ascertained. In considering the pathogeny of retention, M. Mauriac attributes the closure of the passage in most cases to reflex spasmodic contraction of the muscular tissue of the membranous and prostatic urethra, and not to inflammatory swelling of the mucous membrane. The second, or incomplete form of retention, the author has seen occur especially in irritable patients, the subjects of catarrhal 'urethrorrhœa' contracted from women just before, during, or just after the menstrual period. Although reflex muscular contraction is the most frequent cause of retention, inflammatory swelling of the prostate sometimes also causes it. The catarrhal urethritis, or bastard gonorrhœa just mentioned, reaches the deeper portion of the urethra with great facility, and then is frequently accompanied by reflex nervous phenomena. It is also, though apparently such an insignificant affection, quite as frequently complicated with prostatitis, cystitis, epididymitis, and arthritis, as ordinary purulent gonorrhœa. Catarrhal urethritis also often lasts for an indefinite length of time.

Treatment of Retention.—When complete retention has lasted some hours, and the bladder is distended, a gum-elastic catheter, slightly "elbowed," should at once be passed; and if the prostate be unaffected there is usually no difficulty, but if the flexible instrument is arrested by spasm, a well-warmed silver catheter should be used. In incomplete retention leeches may be applied to the perineum and the patient kept in a tepid bath for an hour or two, when he will often be able to pass urine without further assistance. If urine have not passed in the bath, an enema of starch and opium may be given and very hot poultices applied to the perineum. If all these means fail, catheterization is to be had recourse to. In very favourable cases only a single catheterism is required, but usually it has to be repeated during three or four days. The catheter should be used as long as the patient remains unable to empty his bladder completely.—*London Med. Record*, Aug. 15, 1880.

On Lithotrity at a Single Sitting, with a Record of its Results in Forty-six Consecutive Cases.

At the late meeting of the British Medical Association, Sir HENRY THOMPSON presented a paper with the above title and of which the following is an abstract. The paper consisted of a consideration of Bigelow's proposal, with reasons for believing it would issue in an advance for the operation of lithotrity. About eighteen months ago, Sir H. Thompson commenced employing it as the rule, and since that time he had operated in fifty-four cases of stone in the bladder of the male adult, mostly aged; on forty-six of these by the method of one sitting; on two others by multiple sittings; and on six by lateral lithotomy. Among these fifty-four cases were three deaths, two in cases of lithotrity by one sitting, and one after lithotomy. The reasons were given for adopting multiple lithotrity and lithotomy in the eight cases; and the following practical deductions were appended to the paper, as the sum of the lessons to be learned by this contribution towards an attempt to estimate the value of the method in question. 1. In view of a general adoption of lithotrity at a single sitting, it becomes more than ever important to diagnose carefully before operating, the size—and if practicable, as it mostly is—the nature of the stone, so that the means employed to remove it may correspond thereto. For, when the stone is small, or of medium size, as it is in the majority of cases, it is not only unwise but dangerous to employ large and unwieldy instruments to remove it. Small instruments are much safer than large ones, and do less mischief in the bladder and urethra. The latter should never be used, unless the work to be done renders them necessary; and this can only happen in a few exceptional cases. 2. There is no doubt that a practised hand, thoroughly familiar with the details of lithotrity, is more necessary to the success of an operation which is to be completed at a single sitting, when the stone is not small, than to that of an operation which consists of several sittings. In other words, the removal of a large stone at a single sitting is a more difficult proceeding than that which disposes of it at several trials. 3. Speaking with caution, it appeared to him that at present we are not justified in attempting to remove all stones by crushing, and certainly not by any one system of crushing. The new method rendered lithotrity safer than before for the stones already assigned to that process, and extended it to some which were larger than before so operated on. But he still regarded lateral lithotomy (the high operation being sometimes perhaps advantageous) as an admirable procedure not only for hard stones, say of about two ounces in weight and upwards, as a rough general estimate, but also for smaller ones in some cases where the urethra was not large, or other circumstances seemed to indicate it. Further, he could not doubt that many men, whose experience was necessarily small, would cut for a hard stone, weighing an ounce, more safely than they would crush it at a single sitting. Great and irretrievable damage might be easily inflicted by large lithotrites and evacuators in unpractised hands. For two among the forty-eight cases of lithotrity recently operated on, multiple sittings were preferred for the reasons given; and he strongly advises the exercise of an independent judgment in every case, and not the pursuit of any routine method, without reference to the very varied circumstances which calculous disease largely presented.—*British Med. Journal*, Aug. 28, 1880.

Excision of the Knee and of the Hip.

Mr. Timothy Holmes, in his Address in Surgery before the British Medical Association at its recent meeting (*British Medical Journal*, August 14, 1880), presented the following summary of the most recent experience on the subject of excision of the knee:—

1. Excision of the knee is one of the indispensable resources of surgery, and is useful in all three classes of cases; viz., in those where, otherwise, amputation would be indicated; in those where the expectant treatment might succeed, but is dubious; and in cases of vicious ankylosis.

2. As a substitute for amputation, it is indicated in early life, and in non-tuberculous subjects; in cases of limited caries of the bones, of degeneration of the synovial membrane, and in some conditions of necrosis of the articular surfaces; possibly also in abscess in the ends of the bones.

3. As a substitute for the expectant treatment, it seems to be justifiable, and is extensively used in cases where the patient's circumstances and the slow progress of the case render the surgeon hopeless or very doubtful of recovery with sound ankylosis.

4. It is also frequently used, and is very successful, in cases of vicious or deformed ankylosis.

5. Attempts have been made to limit the place of excision by opening the joint and drainage, and by some other partial methods. These attempts have been fairly successful, especially in cases where the affection is rather of the synovial membrane than of the bones, and they deserve more extensive trial than they seem as yet to have obtained.

6. At the same time, the mortality from excision of the knee seems of late years to have been so greatly diminished as to encourage the hope that the limit of age which has been found necessary hitherto to observe may be extended, and it may be judged prudent to apply the operation to the treatment of the more chronic affections of later life, such as chronic rheumatic arthritis, more extensively than has been done up to the present time.

Mr. Holmes then proceeded to consider under what circumstances does excision of the hip become necessary, and under what circumstances it is justifiable, though possibly not absolutely necessary?

He said, let me preface my answer to this question by giving you in a few words the experience of the Hospital for Hip Disease; the only one, as far as I know, in this country where the ordinary disease of the hip in childhood is systematically treated from beginning to end. This institution receives cases of hip disease occurring in poor children, who have, therefore, been usually neglected, and in many of whom suppuration either exists or is imminent. Not a few are in an incurable condition when admitted, and it is this class exclusively that furnishes the fatal cases. No surgical operations are performed in the hospital beyond opening abscesses. The treatment consists in rest, with careful extension; and the most sedulous attention is given to see that the limb is brought into and kept in the natural position. When this has been effected by properly directed extension, and when all abscesses are in a perfectly quiescent state, the child is allowed to get up, wearing a Thomas's splint. No limit is fixed to the stay of a patient in the hospital, where children are often kept for several years.

Under this treatment, the mortality of cases received in an early or curable condition is very small, though a good many of those received in an advanced stage of the disease die, chiefly from amyloid degeneration and from tubercular meningitis. Not more than about 4 per cent. are transferred to the neighbouring Hospital for Sick Children for excision. In hardly any cases are sequestra seen to come away from the openings of the abscesses, and the resulting recoveries are with limbs which are straight, strong, and but little shortened, so that the patient can walk freely with the aid of a high boot, and in the best cases with little limping limbs, which contrast very remarkably with the results of excision. The patients are kept under observation for a long time after their discharge, so that the permanence of the recovery can be verified.

The question of the justifiability of the operation in the ordinary disease of childhood must depend in a great measure on the opportunities which the patient has of obtaining some such treatment as the above. Morbus coxarius is rarely incurable if taken early; it has no necessary connection with any constitutional dyscrasia; there is every reason for believing that the abscess which frequently accompanies it is more often the result of motion injudiciously irritating inflamed parts, than the inevitable or even usual result of that inflammation itself; and I myself most firmly believe that the disease in the bones is very often (not to say almost always) produced by the inflammation of the soft structures, and is usually proportionate in extent to the length and acuteness of the suppuration. I further believe that the constitutional mischief which often ends the life of patients with advanced hip disease is usually not the cause but the consequence of that disease, and that, if we would remove the cause by curing the disease early, there would rarely be any amyloid or tubercular degeneration of the viscera. I can only give you these views as my own, and for what they are worth; I could say much in support of them, but time does not permit. If they be true, what follows? Why, that if we would or could treat hip disease early, before abscess has formed, by continuous and prolonged rest with extension, the great majority of the cases would recover without any abscess. If the patient be not seen till abscess has formed, still long-continued rest with extension will cure most cases, the abscess being early opened and carefully drained, and in only a few of these cases will there be extensive deformity. Even if there be the clearest proof of disease of the bones, still the careful drainage of the abscess, and the properly applied extension, will effect a cure in most cases, provided the treatment be extended over a very long period of time, and a better cure than that by excision will follow. This would leave for excision only those cases in which the presence of sequestra could be ascertained by examination, or reasonably inferred from the refusal of the sinuses to close, and those in which the symptoms were so grave that the surgeon thought it necessary to intervene in order to save life.

In such cases, the operation of excision is sometimes very successful; and its merits in successful cases are even more striking than those of excision of the knee, since it rescues the patient from a graver malady, and saves him from a more formidable mutilation. But I need hardly say that the proportion of deaths and failures will be higher than in the practice of surgeons who use the operation for more curable cases.

But cases such as I have sketched would be rare indeed if the treatment above described were carried out at our large hospitals as it is at this little institution in Queen's Square. How different is the case! Who has not seen with profound sorrow poor children bandied about from one out-patient room to another, getting splints which only very imperfectly immobilize the joint, or receiving instructions to "keep at rest," which the surgeon knows cannot be carried out, till the limp becomes agonizing pain, and the patient is taken into hospital and allowed a little rest in bed? Then, after a few weeks, he is found to be occupying a bed which can be better employed; and, his pain having for a time subsided, he is turned out again. Possibly this process is more than once repeated; and then abscess forms; the joint is found to crepitate; and the surgeon probably knows that if he keep him in again for a few weeks and send him out relieved, the disease will recur in a worse form; and so he recommends excision. I do not say that the surgeon is wrong in his advice under the circumstances; but I do say that the circumstances show our general hospitals to be places where chronic morbus coxarius can hardly be treated successfully.

There are other and rarer conditions of the hip-joint, such as acute inflammation attacking the epiphysial cartilage, which have been treated successfully by excision; and there are cases, though at present very few, in which the joint has been successfully excised at a later age for the cure of rheumatoid arthritis.

I would sum up what I have to say about excision of the hip in a very few words, by the simple statement that it ought to be very rarely indeed required, if the disease were treated properly at its commencement. In cases seen at an advanced stage of the disease, it is chiefly when sequestra exist that the operation is *necessary*, though it may be *advisable* as a means of shortening the treatment in other cases also, when the patient cannot obtain the prolonged surgical care which is essential to natural recovery.

Aortic Aneurism Treated by Galvano-Puncture.

Dr. A. HUGHES BENNETT, Assistant Physician to the Westminster Hospital, reports (*Lancet*, Aug. 7, 1880) a very interesting case of aortic aneurism which was under the care of Dr. Sturges and himself, and was treated by galvano-puncture, and which, although fatal, shows, in Dr. Bennett's opinion, that, if properly performed, the operation itself is not necessarily attended with any danger or even discomfort.

In most of the cases hitherto recorded a small number of cells were used, and yet considerable uneasiness and pain were experienced. This was obviated in the present instance by the use of a rheostat introduced into the circuit, which enabled us to apply the full force of twenty cells without the patient feeling even any uncomfortable sensations. When the current from a large number of cells is suddenly applied to the body, not only is there a severe shock, but the burning pain afterwards is unbearable. It is, however, well known that galvanism is a nerve-anæsthetic; hence a feeble current dulls the sensation for a subsequently stronger one, and this in turn for one more powerful, and so on. Thus, by slowly and insidiously increasing the strength without producing any shock, which the rheostat can accomplish, a current so powerful can be passed through the tissues without pain, which, if suddenly applied, would be intolerable.

In conclusion, Dr. Bennett gives it as his opinion that with our improved knowledge of electricity, and the more perfect instruments for its application we now possess, a great field is opened out for the treatment of aneurisms in general, and those of the aorta in particular. Hitherto the results of this procedure in the latter have not been successful as regards saving life, but this may be explained on the ground that it has only been employed in hopeless cases, and in those after which every other treatment having failed, it has been adopted as a last resource. In the present case, had the operation been performed when the patient first came under observation a year ago, judging from the post-mortem appearances, the prospect of a cure or prolonged alleviation, appears not only possible but probable. As it was, this treatment was carried out because it was judged the patient if left to nature could not live many weeks. Considering that galvano-puncture, if properly conducted, appears to be practically harmless, there need be no hesitation in resorting to its application in any case of aortic aneurism, which can be easily diagnosed to be saccular in character, and which can be reached without difficulty.

Rupture of the Axillary Artery during Reduction of Luxation of the Humerus.

Rupture of the axillary artery associated with simple dislocation of the humerus, or occurring during the reduction, is an extremely serious accident, though happily rare. In one case in which dislocation of the humerus was complicated by diffuse traumatic axillary aneurism, Mr. R. Adams reduced the dislocation, and then ligatured the subclavian artery. The patient recovered. Most of the cases of rupture of axillary artery during the attempts at reduction have been in dislocation of some weeks' duration. Indeed, it is probable that the rupture of the artery is due to laceration of the adhesions formed around the displaced bone in the neighbourhood of the vessels. In the subjoined case no attempt at reduction seems to have been made for at least six weeks. In that time firm adhesions had doubtless formed. If the statement of the patient may be trusted, the rupture of the axillary occurred during the reduction. Unfortunately the mode of reduction is not stated. When admitted into Charing-cross Hospital, under the care of Mr. Bellamy, there was only one alternative. The man must be left to bleed to death or amputation must be performed through the shoulder-joint.

J. H——, aged fifty-five, dislocated his right humerus on Dec. 16, 1879; and in the following month he went to a large metropolitan hospital, where the house-surgeon put him under an anæsthetic and attempted reduction. On Feb. 2d one of the surgeons made further attempts, and the patient stated that he immediately became aware of a swelling in the armpit. A fortnight after this he was discharged. He had lost sensation since the time of the last attempt. Three weeks after he left the hospital a little bright blood oozed through the skin, and on July 30th he had more severe hemorrhage, losing about a quarter of a pint of arterial blood, and then the bleeding ceased.

On admission, situated in the region of the right shoulder was a large tumour. The walls were very tense, and pulsating. The clavicle was distinct, and not involved. The pulsation was best felt at the posterior part of the axilla. The arm below was much swollen and waxy; no pulse could be felt at the wrist. At the lower part of the tumour, in the axilla, the skin was dark and sloughy, from which flowed a watery discharge. The tumour was not distinctly circumscribed at its lower margin, and was about as large as a man's head. The patient was anxious in appearance, and stated that he had been rapidly losing health since the appearance of the tumour. He had had no attacks of syncope or breathlessness, and the face was not markedly blanched. Pulse 96; respiration 18. Conjunctiva and mucous membrane pale and anæmic. He had slight cough and watery expectoration.

After consultation with Mr. Amphlett (who admitted the case from his out-patients) and his other colleagues, Mr. Bellamy determined on amputation through the shoulder-joint. This was done by commencing with an anterior flap, from without and *not* transfixing. Although the subclavian artery was most efficiently compressed by Mr. Bloxam, the hemorrhage on the first sweep of the knife was terrific, the blood coming from the tense sac and from the enlarged vessels behind and below. The second or posterior flap was cut after disarticulation, in a few seconds, and some pounds of clot and organized lymph were removed.

The main trunk, as far as its topographical position should have been, was not recognizable. There was a hard cartilaginous-like tube on the wall of the thorax, throwing a fearful jet of blood, and which, notwithstanding the pressure on the subclavian artery, was secured after great difficulty. After all bleeding points had been secured the flaps were adjusted and the patient removed to bed. Unfortunately, he never rallied, and about an hour afterwards died.—*Lancet*, Aug. 14, 1880.

OPHTHALMOLOGY AND OTOLOGY.

Conjunctival Syphilis.

M. Sichel, Jun., remarks (*Gazette Hebdomadaire*, 23d April, 1880), that syphilitic affections, limited to the conjunctiva, are of such rarity, that he has only been able to collect fourteen satisfactory cases, the majority of these being instances of gummata. Still less frequent are primary sores, or early syphilides. A man, aged 28, came to M. Sichel's clinique, on Oct. 1, 1878, complaining of itching of the right eye, and a sensation as if a foreign body were present. There was no photophobia, nor periorbital pain. The eye was half closed. There was limited injection of the conjunctiva, and at the centre of the injected patch was a small oval tumour, reddish yellow in color, and the size of a grain of wheat. On

October 10, the patient was seen by M. Sichel himself, who found a swelling measuring thirteen by six and and a half millimetres, situated between the insertion of the right internal and inferior recti muscles. The cornea was not involved. The surface of the swelling was excoriated and depressed, and in the depression was a little muco-pus. There was no pain, but only inconvenience from the sensation of a foreign body being present. The patient had an indurated cicatrix behind the corona, enlarged inguinal glands, and a general papulo-squamous syphilitic eruption. The case was seen by Ricord and by Fournier, both of whom diagnosed a papulo-ulcerating syphilide of the conjunctiva. Under mercurial treatment, the eye became perfectly normal by November 22d.—*London Med. Record*, Aug. 15, 1880.

Conjunctivitis from Chloral.

At a late meeting of the New York Clinical Society (*New York Med. Journal*, Sept. 1880), Dr. J. H. EMERSON mentioned a case of ophthalmia produced by the use of chloral hydrate. The patient, a young man, was subject to attacks of asthma, and in two severe attacks chloral, in ten- or fifteen-grain doses, had afforded great relief. This led him, during a recent attack, to employ it each night for some time. Shortly after he began its use, the conjunctiva of the globe and lids became injected, and photophobia existed, with profuse lachrymation. The latter, as it occurred in the left eye, did not correspond with the degree of photophobia. The affection of the eyes required him to keep his bed. Iodide of potassium, which he had been taking, had been discontinued for some time, and the resulting acne and throat-irritation had disappeared. There seemed to be no cause therefore, other than the use of chloral, for the ophthalmic trouble. The treatment first adopted was the application of camphor-water and borax, then of sulphate of zinc and rose-water, but no improvement resulted. The chloral was then discontinued, and immediate improvement took place.

Colour-Blindness.

Dr. FAVRE, of Lyons, recently read a paper of much general interest on the relations of colour-blindness at the Paris Academy of Medicine. He has examined more than ten thousand male adults by different methods, and has discovered that more than ten per cent. of them were not capable of distinguishing one or several of the five elementary colours; he has also met with two cases of serious and comparatively dangerous Daltonism, and eight cases of injurious or troublesome chromatopseudopsia. The examinations made in reference to railroads, the army and navy, would be insufficient if it were necessary to determine by the examination of the sense of colour the aptitude of individuals for those commercial or industrial pursuits which involve the examination of coloured objects. It would, perhaps, be necessary, in that case, to examine two or three hundred shades and colours. Amongst the very numerous mistakes quoted by Dr. Favre, several were made by woollen-drapers, tailors, jewellers, weavers, and dyers. An exact knowledge of colours is necessary to magistrates, and is indispensable to experts, who should have a very acute sense of colour. Dr. Favre quotes instances in which M. Ferraud, an analytical chemist, formerly assistant to M. Chevreul at the Gobelins, has been able to rectify in his reports very important errors committed with regard to colours in the description of inculpating objects in criminal cases. The reports had been drawn up by rural constables, policemen, or other agents of the authority. Chemists, botanists, and micrographists are often very much troubled. General practitioners and chemists suffering from dyschromatopsia know very well generally how to manage matters;

they know how to make use of the persons whose sight is normal. M. Favre has sought out the cases of dyschromatopsia which have been publicly recorded, and especially those which have come before the tribunals of justice. Discussions and quarrels have occurred in schools; some cases have been brought before the tribunals. The examination of the colour-sense of the persons at issue would be sufficient to enlighten the judges. The errors of Daltonians with regard to postage stamps have been so frequent as to determine the French authorities to increase the diameter of the figures, and to exact an examination in colours from their staff. All these circumstances go to prove that such an examination should be more generally resorted to, and that the colour-blind should be made responsible to the law for their mistakes; and, as Daltonism can for the most part be cured by exercise, the legislation required would certainly become an excellent therapeutic agent. Those persons who were past cure would be warned that they must abstain from giving any judgments on coloured objects.—*British Med. Journal*, August 21, 1880.

MIDWIFERY AND GYNÆCOLOGY.

Obstinate Vomiting in Pregnancy.

Dr. **Welponer** states (*Wien Med. Woch.*, May 22) that in consequence of a recommendation of Prof. Braun-Ferwald, who has several times found it useful in private practice, he has met with excellent success in three cases of obstinate vomiting in pregnancy which had resisted all other means, from the application of a ten per cent. solution of nitrate of silver to the vaginal portion of the cervix uteri. He keeps the solution in contact for five minutes, and then dries the parts with cotton-wool. The application requires to be repeated several times at intervals of two or three days; but its ultimate success is remarkable.—*Med. Times and Gaz.*, Aug. 7, 1880.

Treatment of Post-Partum Hemorrhage by Iodine.

Dr. W. E. **Forest**, of New York, claims (*Med. Record*, September 4, 1880) the following advantages for the iodine treatment of post-partum hemorrhage:—

1st. Iodine controls the hemorrhage, not by coagulating the blood within the uterus, but by exciting the uterus to contract. The blood is expelled in a liquid form, and hence, instead of leaving the uterus filled with a mass of hard, sticky clots, ready to undergo decomposition, the uterus is empty and disinfected.

2d. Tincture of iodine has never, so far as I can learn, caused any bad result, even when injected into the uterus in full strength. Thus, in Case V. nearly six ounces of tincture of iodine were injected (four of them without dilution), and yet no bad effects followed its use.

3d. The iodine treatment never fails to control the hemorrhage.

Fatal Peritonitis resulting from an Injection into the Vagina of a Solution of Acetate of Lead.

The following case (*Centralblatt für Gynäkologie*) appears to argue in favour of the possibility, now generally denied, of a fluid injected into the vagina reaching the abdominal cavity through the Fallopian tubes.

A woman, twenty-two years old, suffering from a severe attack of leucorrhœa, was directed to use an injection of acetate of lead. The injections had been successfully made for ten days and with good results. On the eleventh day, on account of an interruption, the injection was hastily made. The woman was immediately seized with violent pains in the lower portion of the abdomen, her face became deadly pale, and syncope supervened. The doctor was immediately called and found that the patient presented the symptoms of acute peritonitis. Death followed seventy-two hours afterwards. The autopsy revealed. besides the ordinary lesions of peritonitis, a precipitate of sulphide of lead on the serous surface of the large intestine, throughout the entire hypogastrum, and even up as far as the umbilical region. The precipitate was in the form of small round, grayish-black spots, which were quite numerous and thick in some places, while in other places they were much scattered and thin.—*Physician and Pharmacist*, Sept. 1880.

Hysterectomy.

Dr. LÉON LABBÉ communicated, at a late meeting of the Académie de Médecine, a note relative to a modification of the operation of hysterectomy as applied to fibrous tumours (exsanguinification of the tumour).

Gastrotomy applied to the treatment of fibrous tumours of the uterus is an operation about which there is no longer any dispute. The note which M. Labbé communicated to the Academy is not for the purpose of describing this operation, but simply to make known an important modification that he has introduced in the operative process.

The quantity of blood contained in these enormous uterine tumours is always considerable. it is certain that the loss of this blood by the ablation of the tumour, is a factor the importance of which cannot be passed over, especially if we consider that the extirpation of these tumours almost always takes place in the cases of women who are in an advanced stage of cachexia. Based upon the principle which had led Esmarch to apply a compress bandage on limbs which were to be amputated. M. Labbé thought the same bandage could be utilized to press back into the general circulation the blood contained in large uterine tumours. and thus practise a kind of transfusion.

The patient for whom he had occasion to apply this principle for the first time, was in a deplorable condition before the operation. and she succumbed six days later to septicæmic symptoms; but M. Labbé has been able to prove that the enormous fibroma upon which compression was first practised was entirely exsanguined. and that about a litre of blood was by this means restored to his patient.

The theory which led M. Labbé to apply Esmarch's compress to restore to the general circulation, at the time of their extirpation. the blood contained in such great abundance in the fibro-myomas of the uterus. is very clearly justified by the case which has been reported to the Academy.

The peculiar conformation of the tumour was such that no very particular method was employed in this case; but if the tumour to be operated on is more regular in form we would have just reason to fear that the application of the elastic band might present some difficulties. In this case. to fasten the band and give it a support we should transfix the tumour near its summit by one or more metallic needles. Several of these needles may even be placed at different heights so as to give support to the compress, and to prevent its slipping.

M. Labbé concludes:—

1st. That there must be a positive advantage in operations on large uterine fibro-myomas removed by gastrotomy, in restoring to the patient the blood which these tumours always contain in large quantity.

2d. That this result may be employed in a complete manner by applying to the tumour Esmarch's compress, or any other compress endowed with the same elastic properties.—*Gazette Hebdomadaire*, 6 Août, 1880.

Extra-Peritoneal Ovariotomy.

Mr. W. A. Meredith, Assistant Surgeon to the Samaritan Free Hospital for Women, reports (*Lancet*, August 21, 1880) the following remarkable and, it is believed, unique case of a completely extra-peritoneal ovarian cyst. Mr. Meredith says: I have myself seen but one other at all resembling it[1] in nearly three hundred abdominal sections at which I have assisted; and Mr. Thornton's much larger experience tallies with my own in this respect. I have in vain searched through the Transactions of the Medico-Chirurgical, the Pathological, and the Clinical Societies, for a record of any similar case, and none of the best-known authorities on abdominal tumours, whose works I have been able to consult, make any mention of such a condition.

M. M—, a delicate-looking woman, aged 27 years, came to me at the out-patient department of the Samaritan Hospital about the middle of May last, complaining of abdominal enlargement. She gave the following history: Menstruation occurred for the first time shortly after her marriage, at the age of twenty-four, three years and a half ago; the flow, which was scanty, recurred at irregular intervals on seven or eight occasions during the first two years of married life, but for the past eighteen months she had seen no further signs of it. She had never been pregnant. About a year and a half ago, in the beginning of 1879, shortly after the last appearance of the menses, she first noticed some increase of size in the abdomen, and was troubled with "dragging" pains in the left side. The swelling, after steadily increasing for some weeks, suddenly began to diminish, and entirely disappeared in the course of the next few days coincidently with the passing of a considerable quantity of clear pale urine. From this time she enjoyed her usual health until about six months previous to her visit to the hospital, when, shortly before last Christmas, she noticed that her abdomen was again enlarging; the swelling, which steadily increased, had latterly been accompanied by a return of the old pain in the left side, and further by considerable discomfort from flatulence.

On examination, I found that the abdominal enlargement was evidently due to the presence of a cystic growth.

The patient was admitted into the Samaritan Hospital a fortnight later, on June 2d, when the following notes were made of her condition: "The abdomen is pretty uniformly distended by an elastic, indistinctly fluctuant, tumour, which reaches upwards to about midway between the umbilicus and the xiphoid cartilage. There is no perceptible downward movement of the upper border of the cyst on deep inspiration, and palpation conveys the idea that the growth is closely adherent anteriorly to the abdominal wall. Fluctuation, which was tolerably evident when I first examined the patient a fortnight ago, is now less distinct, and with doubtful limits, owing probably to increased tension. The percussion note is quite clear over the epigastrium, and this resonance extends in the mid-line downwards as far as to the umbilicus, or rather below it. A clear note is obtained on percussion far back in the right lumbar region, but the left flank is absolutely dull. The girth at the umbilical level measures 30 in. On pelvic examination, the cyst is felt very distinctly in front of the cervix. The sound passes 2½ in., showing the uterus pressed backwards in the hollow of the sacrum, with much impaired mobility."

The following diagnosis was made: "Broad ligament cyst, with very broad and close attachment to the right side of the uterus, and extensive parietal and intestinal adhesions in the abdomen."

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[1] The details of the case referred to are to be found in the twenty-ninth volume of the Transactions of the Pathological Society for 1878, p. 145.

On June 15th the patient was operated on by my colleague, Mr. Thornton. On making the usual incision in the median line midway between the umbilicus and the pubes, the tumour was at once exposed, after dividing the linea alba, and was found to be everywhere covered by loose vascular connective tissue. After vainly endeavouring to find a way into the peritoneal cavity, Mr. Thornton tapped and emptied the cyst, which he then tried to enucleate from its capsule, but unsuccessfully, owing to the extreme thinness of the cyst wall. Attempts were next made to invert the cyst by pulling upwards the deep and hinder part of the inside of the sac, in order to effect an opening through its base into the pouch of Douglas; but each attempt merely opened up successive layers of vascular areolar tissue. The uterus could be plainly felt through the cyst wall, apparently closely adherent to its capsule; and coils of intestine were also clearly distinguishable. Below the cyst could be felt a mass of small cysts and solid tissue—evidently the right ovary. No trace of the left ovary could be made out.

Having ligatured and cut away two portions of the capsule, Mr. Thornton gradually succeeded in enucleating the remainder with the contained bunch of cysts and the right ovary, until he came down upon an attachment to the right cornu of the uterus; here he transfixed and tied, cutting away the ovary, and the remains of the cyst, leaving a very short pedicle, in which was seen included the cut end of the Fallopian tube.

On examination subsequently, the parts removed were found to consist of an extremely thin-walled multilocular cyst, partly encapsuled in loose connective tissue, and having an enlarged cystic ovary closely adherent to its base.

The patient had some slight elevation of temperature during the first three or four days after the operation, but otherwise progressed without a bad symptom. The sutures were all removed at the first dressing on the tenth day, when the wound was found perfectly healed, and she left the hospital on the twentieth day.

The details of the operation leave no doubt as to the truly extra-peritoneal nature of the cyst, inasmuch as all attempts made to open into the general peritoneal cavity, either by passing the hand upwards over the upper margin of the tumour, or by endeavouring to effect an opening through the base of the cyst into Douglas's pouch, failed entirely in effecting their object. When attempting the former procedure, Mr. Thornton came upon the cæcum and vermiform appendix completely inclosed in loose vascular connective tissue, and closely applied to the cystic wall. This condition of things was evidently due to the adhesive inflammatory action set up in its immediate neighbourhood by the rapidly growing cyst.

With regard to the question of the mode of development of this tumour, I believe the following to be the true explanation of its origin: The cystic disease commencing in the outer end of the ovary (whether from a distended Graafian follicle or as the result of an epithelial ingrowth, it is not at present my intention to discuss), probably gave rise to the formation of a true ovarian cyst, lying at first encapsuled in the cellular tissue between the layers of the broad ligament. In the subsequent course of its growth this cyst, distending the layers of the broad ligament, continued to develop in the direction of the least resistance—viz., more or less directly onward—until, having reached the seat of reflection of the parietal peritoneum, it gradually opened up the layer of subperitoneal cellular tissue which lies beneath the transversalis fascia lining the abdominal wall, and thus came to constitute a truly extra-peritoneal tumour.

Oöphorectomy in Cases of Dysmenorrhœa.

MR. LAWSON TAIT, in a recent paper on this subject, referred to the inevitable opposition and hostile criticism to which every new operation was subjected, and noticed at some length the history of several operations which have been introduced within the last thirty years. He pointed out that, even in some cases when they overcame hostile criticism, it still remained a matter of doubt (as in the case of the resection of the knee-joint) whether the operation, by its results, was justifiable or otherwise.

For the relief of dysmenorrhœa by oöphorectomy he claimed the following advantages: 1. Comparative safety of the operation, as no fatal results had followed the operation in his hands; 2. Immediate or almost immediate benefit to the patient, pain and hemorrhage being in every case alleviated, and in a majority of the cases entirely removed; 3. Great improvement in the bodily condition and general health of the patient; 4. Restoration in the cases of women dependent for their living on labour to a position in which they are enabled to remain in domestic service, or discharge other labour, without the interruption as heretofore of several days in each month.

Mr. Tait then gave very full details of the cases of fifteen women upon whom he had performed the operation, from which it appeared that in nearly all it was called for by the existence of menorrhagia, attended with great pain and suffering in some of the cases, with excessive hemorrhage in others, threatening life itself. In all the cases, they had for years resisted every known method of treatment. The ages of the patients operated upon varied from twenty-one to thirty-seven years. Some had been married, and had borne children; some were unmarried. In the majority, the history had been the same; cirrhosis of the ovaries, following ovaritis, the sequelæ of some of the exanthematic diseases, with more or less malposition of the uterus; and in some of the cases, adhesion of the ovaries to the rectum and other organs. Many of the cases were women in domestic service; three were, however, in the upper class of life. To the former class, Mr. Tait alleged that the most marked benefit would be derived from the operation, as it enabled them to earn their living, when in many cases they had ceased to be able to do so, and had become a burden to their relations or friends, owing to the necessity of remaining in the prone position from ten days to a fortnight monthly. In women of the upper class, Mr. Tait was understood to say that he would hesitate to recommend the operation, except when it was necessary to save life, or when pain was so excessive that existence was a burden to the patient.

Mr. Tait then proceeded to rebut the various objections which had been brought, or might possibly be preferred, against the operation.

1. *Unsexing the patient.*—With regard to this point, Mr. Tait said that, as the diseases for which the operation was done had already unsexed the patient as far as child-bearing was concerned, and in many cases as far as marital functions also, this argument was futile. The operation often restored the sexual capacity previously destroyed. In this the operation had had, in his experience, exactly the opposite effect attributed to it in the argument he was discussing.

2. *Destroying the sexual instinct and desire in women.*—Mr. Tait said that this was wholly a misconception, and that, in fact, no such consequence resulted. Two of the patients operated upon were married ladies of good position, and they stated that it made no difference whatever in their marital relations; and all stated that no change whatever had been brought about in their feelings to the other sex.

3. *Alteration of voice, appearance, etc.*—This was also a bugbear; for, except the increased flesh consequent upon improved general health and relief of pain, there was no abnormal increase or tendency to adipose development. There was no change of voice whatever, nor was there any disposition apparent to abnormal or undue growth of hair. This was due, he thought, to the fact that in

no case would the operation be performed until after puberty, and that after that period no change followed either in the sexual feelings or physical appearance.

4. *Criminal abuse of the operation.*—The possibility of such an idea occurring, even if any member of our profession could be found base enough to prostitute his abilities for the commission of such a crime, was indicated by Mr. Tait with great force. He showed that no woman could be found to undergo such a very serious operation, involving the laying open of the abdomen, for the purpose of procuring exemption from the consequences of sexual intercourse. As a matter of fact, in the course of his practice, he had found that the mere discussion of the operation was sufficient to give great relief to the symptoms, when such were exaggerated or due to hysteria. In fact, in such cases it helped us in diagnosis, for only genuine cases would submit to it. Mr. Tait frequently referred, for confirmation of his views and opinions, to a treatise on gynæcology recently published by the distinguished American, Dr. Goodell. In the United States, he remarked that oöphorectomy had already passed the probationary stage, and was recognized as an established operation—in fact, had been hailed as a means of relief for otherwise incurable suffering.—*British Med. Journal*, Aug. 7, 1880.

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

The Antagonisms of Aconitia on the Frog's Heart.

Dr. SYDNEY RINGER has recently been making an experimental study of the antagonisms of aconitia on the frog's heart (*Journal of Physiology*, vol. ii., Nos. 5 and 6), and the following is a summary of his conclusions:—

1. Aconitia slows and weakens the heart and inco-ordinates the ventricular contraction, this inco-ordination occurring before the heart's contractions are greatly weakened.

2. Sometimes the contractions, though greatly slowed and very inco-ordinate, continue fairly strong till the heart stops.

3. Aconitia acts on the ventricle far more rapidly and powerfully than the auricles.

4. Aconitia has a more powerful action on the cerebro-spinal centres than on the nervous structure of the heart, for after complete paralysis the heart often continues to contract well for a considerable time.

5. The general depression from a poisonous dose of aconitia is partly, and perhaps chiefly, due to the direct action of the drug on the nervous centres, rather than to the weakening of the circulation, consequent on the failure of the heart.

6. Atropia antagonizes the action of aconitia on the heart. It restores the contractions in a heart arrested by aconitia, and strengthens, accelerates, and co-ordinates the heart simply weakened, slowed, and inco-ordinated by aconitia.

7. Aconitia does not antagonize the action of muscarin, nor can muscarin antagonize the action of aconitia on the heart.

8. Atropia antagonizes the combined effects of aconitia and muscarin.

9. Pilocarpine does not antagonize the action of aconitia on the heart.

10. Atropia antagonizes the combined effects of aconitia and pilocarpine.

11. I have suggested that the antagonisms are due to chemical displacement. Atropia antagonizes muscarin, pilocarpine, and aconitia, because it has a stronger affinity for the muscular and nervous structures of the heart than these substances, and displaces them, replacing their effect by its own.

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